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INDEX TO EVIDENCE
AND EXHIBITS

Page No.

BANDEEN, Robert Angus

DIRECT EXAMINATION (RESUMED)

By Mr. McDonald

2238


STENASON, Walter John

DIRECT EXAMINATION

By Mr. Sinclair

2434

EXHIBIT NO. 57-EE	Statement	NR 1-33	2296
57-FF	"	1-34	2296
57-GG	"	1-35	2296
57-HH	"	1-36	2296
57-II	"	1-37	2296
57-JJ	"	1-38	2296
57-KK	"	NR 2-1	2315
57-LL	"	2-2	2315
57-MM	"	2-3	2316
57-NN	"	2-4	2316
57-OO	"	2-5	2316
57-PP	"	2-6	2323
57-QQ	"	2-7	2326
57-RR	"	NR 3-1 NR 3-2	2341
57-SS	"	3-3(Revised)	2351
57-TT	"	3-4	2359
57-UU	"	3-5	2361
57-VV	"	3-6	2365



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EXHIBIT NO. 57-WW	Document entitled Canadian National Railways, Crow's Nest grain traffic study, solely related lines, showing right of way miles, fence miles and miles of all tracks	2376
57-XX	Statement NR 3-7(Revised)	2388
57-YY	" 3-8	2394
57-ZZ	" 3-9	2410
57-AAA	" 3-10(Revised)	2419
57-BBB	" 3-11	2430
58	Two sheets re foreman's work report card	2437
59	Document entitled C.P. Railway's statement in respect of yard engine hours in Western Canada	2437
60	Document entitled C.P. Railway statement in respect of yard and road switching minutes to move grain products in Western Canada	2438
61	Document entitled "Grouping of Expense Accounts in the Cost Study and Methods used to determine Costs."	2440
62	Document entitled "Results of Regression Analysis used in Cost Study."	2440
63	Document entitled "Variable portion of Road Maintenance Expense applicable to the Study Traffic"	2440
64	Document entitled "Variable Portion of Equipment Maintenance applicable to the Study Traffic."	2441
65	Document entitled "Variable Portion of Transportation Expenses applicable to the Study Traffic"	2441



ANGUS, STONEHOUSE & CO. LTD.
TORONTO, ONTARIO

111

Page No.

- EXHIBIT NO. 66: Document entitled "Cost
of Money for Invest-
ment in Road Property
and Equipment applic-
able to Study Traffic." 2441
- 67: Document entitled "De-
velopment of Cost for
Lines Solely Related
to the Study Traffic." 2441
-



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ROYAL COMMISSION ON TRANSPORTATION

Proceedings of hearings held in the
Court Room, Board of Transport Com-
missioners Offices, Ottawa, Ontario,
on the 14th day of December, 1959.

COMMISSION

Mr. M. A. MacPherson, Q.C.	Acting Chairman
Mr. H. Anscomb	Member
Mr. A. H. Balch	Member
Mr. H. Mann	Member
Mr. A. Platt	Member

COMMISSION COUNSEL

Mr. A. G. Cooper, Q.C.
Mr. G. S. Cumming
Mr. H. W. Ellicott - Advisor.

Mr. F. W. Anderson	Secretary
Major N. Lafrance	Assistant Secretary

In the absence of The Honourable
Mr. C. P. McTague, Q.C., Mr. M.A.
MacPherson, Q.C., presided.

Mr. R. Gobeil, also absent.



Ottawa, Ontario,
Monday,
December 14, 1959.

---On resuming at 10.00 a.m.

THE ACTING CHAIRMAN: Gentlemen, will you come to order? Mr. Bandeen is on the stand. I have been wondering, without destroying the effect of the evidence, if we could shorten it up in any way? I was also wondering who the next witness would be. Mr. Stenason.

MR. SINCLAIR: That is right.

THE ACTING CHAIRMAN: I think you raised the question, Mr. Sinclair, as to his not giving evidence unless --

MR. SINCLAIR: I think I went so far as to say I felt, in view of the time that everyone should be cross-examined and that is what I expected and that was what was said in the record of September.

THE ACTING CHAIRMAN: Well, it would be much more desirable from the standpoint of the Commission to get through with each witness as he comes up but I am afraid that it will be impossible with the attitude of counsel to have the evidence taken in chief and then cross examined. Perhaps it would be best to have the witnesses stand down for cross-examination.

MR. SINCLAIR: To a fixed date?

THE ACTING CHAIRMAN: Well, that is a date we will have to decide. As I indicated to you, we



are meeting at 4 o'clock this afternoon to fix that date. I think we will go on with the examination in chief and then stand the witness down for cross-examination.

Mr. McDonald, while we must not miss any of the real explanations that Mr. Bandeem would like to make in relation to the record, I think we should try to get on as fast as we can and leave off the record any of the tables or that sort of thing which would ordinarily take a lot of time.

MR. McDONALD: Well, I would suggest then that we could take the precis of evidence as read, that is Exhibit 57, and Mr. Bandeem will make his explanations on different points with reference to the page. He could explain the exhibits and any changes.

THE ACTING CHAIRMAN: Yes, as long as the meat of the thing is in. All right then, we will go ahead and try that and see how we get along.

MR. McDONALD: Mr. Bandeem, on Friday you had reached page 13 in your precis of evidence and the reporters have a copy of the precis and we will put that into the record starting at locomotive miles.

MR. BANDEEN: Train Miles: The total train miles produced by the movement of grain being studied were obtained by calculating for each train run the number of trains in both directions multiplied by the train trip miles.

Locomotive miles: Locomotive miles on a division exceeds train miles by the number of light engine miles, train switching miles, helper



engine miles and doubling miles. For each division the ratio of freight locomotive miles to freight train miles for 1958 was produced from company records. This ratio was applied to train miles of grain traffic on each division to convert them to locomotive miles. In this way the total locomotive miles applicable to the movement being studied was obtained.

Unit miles: The average number of diesel power units per freight train by train runs and by direction experienced during 1958 was obtained from company records. This was multiplied by the number of locomotive miles per train run to obtain unit miles per train run.

Miscellaneous data: The number of cars of study traffic moved through, originated and terminated at each terminal and the number of cars picked up and set out by subdivisions were taken from the basic data as were car miles loaded and empty by subdivision by direction.

Other supplementary statements which were produced are:

NR 1-33 Number of cars, tons and revenue applicable to each grain terminal.

NR 1-34 Number of carloads and the elevators to which grain was delivered at the Lakehead.

NR 1-35 Number of carloads and the elevators to which grain was delivered at Vancouver and New Westminster.



NR 1-36 Shows the average loaded car haul of the Crowsnest traffic to each grain terminal.

NR 1-37 Shows details of the 'stop-off' charges assessed at each milling point.

NR 1-38 A comparison of 1958 Crowsnest revenue and revenue ton miles with similar data for the Western Region and the all Canadian lines portion of the Canadian National System.

To allow for the movement of Company materials a percentage increase was applied to the grain traffic units being costed. This percentage increase was computed from the ratio of non-revenue freight net ton miles on the Western Region during 1958 to the total revenue freight net ton miles on the Western Region during the same year.

(b) Field studies to establish times required in switching the study traffic.

Data relating to the switching service required at yards and terminals by grain and grain products traffic were developed through an extensive programme of field studies.

Field work was conducted, during the period March 18th - August 22nd, 1959, at a total of eighteen yards. Studies were carried out at all principal destination and intermediate terminals for grain and related traffic, including Vancouver, Prince



Rupert, Edmonton, Saskatoon, Winnipeg and Port Arthur-Fort William. Studies were conducted also at twelve secondary yards, each within the pattern of the grain movement, and selected from across the Western region as being representative of the smaller yards in which switching is performed wholly, or in part, by regular switching assignments. Included in this group were Jasper, Calgary, Hanna, Prince Albert, Dauphin, Kamsack, The Pas, Brandon, Hudson Bay, Melville, North Battleford and Rainy River.

The survey programme encompassed the major milling-in-transit points and those terminals, Edmonton and Calgary, at which grain traffic is interchanged by the Canadian National and Canadian Pacific for road movement to Vancouver under the Reciprocal Handling Agreement.

Detailed studies, which included a comprehensive analysis of actual switching operations over a four-day period, were made at each of these yards and terminals. This work was carried out by a special survey team under the direction of a regional operating officer. The team was comprised of research staff and Operating Department personnel from the Western Region having general background knowledge of yard operation and the system of yard office records.

The survey programme was initiated with the west coast terminals, through which there is an all-season movement of export grain. The studies commenced at Vancouver on March 13th, and progressed



on a schedule timed to coincide with the development of the eastward grain movement, concluding at Port Arthur-Fort William on June 13th, and at The Pas, on the Hudson's Bay route, on August 22nd.

STUDY SCOPE AND METHODS:

The study programme, developed in general outline with the Canadian Pacific, involved a three phase study of each of the selected terminals and yards:

(1) A basic analysis of actual switching operations designed to develop the elements of switching service performed in the terminal and the average minutes of switch engine time per car required to perform each such element.

(2) Development of the elements of switching service accorded grain and grain products and, from this together with the information derived from the basic yard analysis, determination of the total minutes of switch engine time per car required for the handling of this traffic and the related empty car movement.

(3) Determination of the bad order ratio on grain and grain products traffic and on related empty car movement for the purpose of establishing the number of cars requiring special switching at yards and terminals for repair.

(1) Basic Yard Switching Analysis:

The initial study work at each yard was a



detailed analysis of actual switching operations over four consecutive days. The four-day study period provided a representative composite picture of switching operations under normal variations in the pattern of yard work and was, in each case, Wednesday through Saturday.

The nature of the studies necessitated that the basic information be developed directly through the individual Yard Foreman actually performing the switching. This involved, over the course of the whole survey programme, the obtaining of written reports from the Yard Foreman in charge of some 900 individual switch engine shifts, whose assistance in the provision of accurate work records was essential to the completion of the study. This factor was stressed in both the planning stages and in field procedure. Contact was made at Regional level with the General Chairman of the Yardmen's Organization who was acquainted fully with the scope and objectives of the survey and supplied with copies of the study forms for distribution to organization officers at the terminals concerned. This was followed up by liason between the local officers and the survey team in the field. There was also a Yard Bulletin issued at each terminal several days in advance of the actual survey dates. (Statement NR 2-1). The Bulletin outlined the survey methods and provided the information that the surveys were being made to determine switching



service required by various types of traffic handled, data required for costing railway traffic.

Each Yard Foreman reporting for work during the study period was issued a special survey form entitled "Yard Foreman's Work Report" for completion during his tour of duty. This "Work Report" was printed on cardboard stock for convenient handling and designated for study purposes as Form T-1 (Statement NR 2-2).

The Yard Foreman maintained on this form a complete log of his shift recording each item of work performed and the time taken together with certain necessary car counts, and accounting for all time in accordance with the instructions printed on the reverse side of the form. Sample copies of the "Work Report" showing typical entries were posted at each terminal several days in advance of the survey period to provide adequate opportunity for each Foreman to familiarize himself with study requirements.

The "Work Reports" were issued individually to each Foreman at the start of his shift by a member of the survey team who discussed with him the particulars of the assignment and clarified, where necessary, the information required for study purposes. The completed card was subsequently returned at the end of the shift to a team member who reviewed the entries with the Foreman to ensure that all time had been accounted for and that the card provided a clear record of all service performed



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Bandeem, Dir. 2245
(McDonald)

and the number of cars handled. These final checks revealed a consistent standard of careful preparation which reflected the degree of co-operation and assistance received throughout the survey programme.

The information on the completed "Work Reports" was then used to prepare study Form T-1A, "Recapitulation of Yard Foreman's Work Report by Elements of Service" (Statement NR 2-3). On these forms, the time worked by each switch engine was broken down into the various elements of switching service and non-productive or overhead time. The principal elements of switching service include classification operations, transfer operations, industrial switching, scaling, repair track switching and work associated with passenger trains and equipment. Each of these basic categories was subdivided according to the complexity and pattern of operation of the particular yard under analysis, the total number of switching elements varying from six to seven for a small yard upwards to sixty-two for the Winnipeg terminal.

All overhead time for the engine was separately compiled. This included all time, normal to yard operation, when cars were not being moved such as: waiting engine or instructions, lunch, taking fuel, and when blocked by other yard engines or road trains arriving and departing. The overhead time was subsequently prorated over the elements of switching service in proportion to the time spent, thus yielding for each yard



engine shift the total number of minutes properly assignable to each category of work actually performed.

On these Forms T-1A (Statement NR 2-3) was compiled also, in conjunction with each element of service, the number of cars to which service was rendered, for example, the number of cars scaled, the number switched to and from each industry, etc. The car counts, except for classification operations, were compiled directly from the "Work Reports". These were spot checked to ensure accuracy and verified, when possible, from local yard records such as switch lists and terminal transfer reports. The car counts for classification operations were tabulated on a daily basis by a direct count of cars arriving on road trains, and inter-yard transfers with necessary additions for cars entering the classification area from the repair tracks, from industrial switching areas, etc.

The preliminary recapitulation of each assignment on Form T-1A was completed immediately following the test period and at the individual terminal, to have available the assistance of the local supervisors, when required, for proper understanding and interpretation of the study data.

As the final stage of the analysis, the individual Forms T-1A were summarized on a terminal basis for the study period on Form T-1B,



"Terminal Recapitulation by Elements of Service". (Statement NR 2-4). The time consumed and the number of cars handled for each element of service appearing on the individual T-1A was entered in the appropriate column. Information derived from each switch engine assignment worked during the four-day study period was entered in this manner and the columns totalled. This provided, on a terminal basis, the average minutes of switch engine time per car required for each element of switching service performed.

The nature of the study results can be illustrated by an extract from the Edmonton Terminal Report (Statement NR 2-5). This shows the breakdown of the total 96,880 switch engine minutes worked during the survey period with the related car counts, and the minutes per car required to perform each individual element of switching service characteristic of that particular yard. A similar analysis was made of each of the eighteen terminals studied.

(2) Elements of Switching Service Accorded Grain and Grain Products.

The second phase of the studies was the development of the pattern of car handling in the terminal and the establishment of the specific elements of switching service accorded grain and grain products traffic and related empty car movement.

This included a description of the elements



Bandeem, Dir. 2248

of service involved not only in inter-train and intra-train switching of loaded and empty cars moving through the yard, but also in the switching of loads and empties to and from each mill and elevator in the terminal, in the switching of bad order cars to and from the repair tracks, in the handling of empty cars in and out of cleaning tracks prior to mill placement, in the switching of cars requiring transfer of lading, etc.

The basic data in this regard were derived from the experience of the local supervisory staff and were verified by actual field checks.

From this information was developed a listing of the elements of switching service involved in the handling of all segments of grain and related traffic within the terminal. This involved the tabulation of the individual switching elements such as classifications, transfers, etc., actually required to handle a car of grain traffic through the terminal or to and from any of the local mills and elevators. Similar tabulations were made of the switching elements involved in placing empty cars for loading, in switching out cars made empty, and in handling defective cars to and from the repair tracks.

There was then applied, to each component element, the minutes per car as developed through the field studies. This yielded, by sum, the total minutes of switch engine time per car required to perform each service related to the handling of grain and grain products traffic. The method of compilation and the nature of the results can be illustrated by the report prepared on the



Port Arthur-Fort William terminal. (Statement
NR 2-6).

This report shows, on pages 5 to 27, the component elements, and the resultant total minutes of switch engine time, required for each service accorded grain and grain products traffic within this particular terminal. It sets forth the total minutes per car involved in handling terminating traffic to each of the twenty-nine local unloading points, either to the elevator if on Canadian National trackage, or to interchange point if served by the Canadian Pacific. It sets forth, also, the switching minutes per car involved in the outward movement of related empties from each point and in the handling of defective cars.

Comparable information was developed and a similar report prepared for all terminals studied, setting forth for each, the handling of grain and related traffic and the total minutes of switch engine time per car required for each component service accorded this segment of traffic within the terminal.

(3) Bad Order Switching Related to Grain and Grain Products.

The third and final phase of the field studies was the development of a measure of the bad order ratio. That is, the proportion of loaded grain cars, and those in related empty movement, found bad order at each yard and terminal, thus requiring extra handling to and from the local repair tracks.



A study was made of the number of loads of grain and grain products arriving at each terminal in bad order condition during a test period and of the total number of loads of grain and grain products which arrived at the terminal during that period. The percentage derived from these two counts provides a measure of the total number of cars requiring bad order handling, which may then be used to compute the amount of switch engine time involved.

A similar study was made of the number of empty box cars which arrived at each terminal in bad order condition and the total number arriving during the test period, again for the purpose of ascertaining the amount of switch engine time consumed in the handling of bad order empties which can be related to grain and grain products traffic.

The test periods for these studies were varied with the size of the terminal. At smaller yards, data were collected for the full year 1958. At the intermediate and larger terminals sampling procedure was used with a minimum sample of 5 per cent of the year 1958.

Development of total switching minutes.

The subsequent step was the development, from the data provided by these terminal surveys, of the switching required to handle the total grain and grain products traffic moved under statutory and related rates during the year 1958. This represents the aggregate minutes of switch



engine time involved at all yards and terminals in the switching of this segment of traffic, including the associated empty car movement.

The analysis was made in terms of the six broad categories of switching service involved:

(1) Switching of through cars, including both grain and grain products traffic and related empty car movement.

(2) Switching of traffic handled under the reciprocal agreement.

(3) Switching of terminating traffic at destination terminals.

(4) Switching of originating traffic at yards and terminals.

(5) Switching of milling-in-transit traffic.

(6) Switching of cars requiring transfer of lading.

(1) Switching of through cars:

The time included in this category is that related to the inter-train and intra-train switching of cars at all intermediate yards and terminals between the point of origin and final destination.

Loaded Movement:

The basic statistics and the traffic routing data provided the number of loads of grain and grain products handled through each yard and terminal serviced by switching assignments. With this information, the total switching time involved was then derived



as the product of the number of cars and the required minutes per car.

For each of the terminals surveyed, the minutes per car were taken directly from study data. The yards and terminals included in these surveys accounted in the year 1958 for 83 per cent of the total yard freight switching on the Western Region measured in terms of engine hours. For those smaller terminals not studied, the minutes per car applied were those from comparable yard operations included in the field survey results.

Related empty movement:

A similar calculation was made with respect to the switching of empty cars. The empty movement pattern, as established by related studies, was expressed in terms of the number of cars handled through each yard and terminal. The total switching minutes at each yard and terminal was then established by multiplication of the number of cars involved and the applicable minutes per car.

The total obtained for the empty car movement were subsequently combined with the minutes required for the handling of the loaded movement to give, for each yard and terminal, the aggregate number of minutes required for the switching of through grain and grain products traffic and associated empty car movement.

(2) Switching of reciprocal traffic:

This is the switching involved in the interchange of grain and grain products traffic by



the Canadian National and Canadian Pacific at Calgary and Edmonton. Switching at Calgary includes the classification of the traffic and delivery to the interchange point. Involved at Edmonton, is the handling of the traffic from interchange and its classification for departure west. This includes the switching of traffic received directly from the Canadian Pacific, and also Canadian Pacific traffic received in interchange from the Northern Alberta Railways.

The breakdown of reciprocal traffic and the number of cars handled at each terminal was provided from the basic statistics. The total switching minutes required for the handling of this segment of the traffic at each point was accordingly established as the product of the number of these cars and the average minutes per car as developed through the terminal surveys.

(3) Switching at destination terminals:

Destination switching represents the engine time involved in the handling of arriving traffic at the final terminals - Prince Rupert, Vancouver (including New Westminster and Victoria), Port Arthur-Fort William and Churchill. This includes the classification of the traffic; transfer to, and placement at each elevator, shed or pier; and the return of the empty from the unloading point to a location in the terminal from which it can be forwarded or redirected for local loading.



Vancouver and Port Arthur-Fort William:

The basic statistics provided a breakdown of the total number of cars arriving at each of the terminals by unloading point, both those served by the Canadian National and those served exclusively by the Canadian Pacific. The minutes per car as developed by the terminal surveys were applied to each component group covering placement for unloading or movement to interchange as appropriate. A similar calculation was made of the aggregate time involved in the switching out of empty cars and the handling from interchange of cars unloaded on the Canadian Pacific.

Prince Rupert:

The same method was used to determine the total switching minutes related to study traffic terminating at the Canadian Government elevator at Prince Rupert, the exclusive unloading point.

Churchill:

Yard switching assignments at Churchill are related directly to the seasonal grain movement. Destination switching time for this terminal, therefore, was established by direct analysis based on the year 1958. As at other terminals, the figures derived provide for the handling of both inward loads and related outward empty movement, excluding only the non-grain switching involved.

Victoria:

A similar method was used at Victoria, where the switch engine serving the terminal elevator



is confined to the Ogden Point docks. The total switching minutes applicable to grain and grain products was developed by a direct analysis of the actual 1958 operations.

(4) Switching of originating traffic at yards and terminals:

Switching service related to originating traffic represents the time involved in placement of the empty at the elevator and the subsequent handling of the load from the elevator to the yard, including classification for departure in the road train.

The basic data, the number of cars loaded out at each yard and terminal and at each elevator, were compiled from the basic statistics. These data were then converted to total minutes, for each point, by the application of the required switching minutes per car. For each of the eighteen terminals studied, the actual figures developed were used. For those not included in the survey programme, which were all small yards, averages were used derived from the data on the twelve smaller yards studied.

(5) Switching at milling-in-transit points:

Milling-in-transit switching occurs at six terminals - Edmonton, Calgary, Regina, Moose Jaw, Saskatoon and Winnipeg. The switching required in connection with this segment of the traffic falls into four general groups:



(a) The classification of arriving loads, and placement at the mill or to the interchange point when consigned to mills on Canadian Pacific trackage:

(b) The outward handling of cars made empty, from the mill or from interchange:

(c) The inward movement of empties for loading including, where necessary, switching to and from cleaning tracks prior to placement for loading; and

(d) The outward movement of loads and their classification for departure from the terminal.

Switching times per car were available, from the field surveys, for each component switching service and for each mill at Saskatoon and Winnipeg, the principal milling points. These data were also available for Calgary and Edmonton. For Moose Jaw and Regina, which together accounted for less than 12 per cent of the total milling traffic, representative figures were derived from comparable operations at other terminals studied.

The minutes per car were applied directly to the number of cars involved, as developed from the basic statistics, and the total engine time related to the switching of milling-in-transit traffic established in this manner for each of the six terminals. Adjustment was made during the development of these totals for cars cleaned at the mill and reloaded out.



(6) Switching of cars requiring transfer of lading:

This category represents the switching related to the handling of cars which developed, while en route, defects of a nature such as to necessitate the load being transferred to another car.

Switching time includes the handling of the defective car to the repair tracks for detailed inspection and, if necessary, subsequent movement to trackage where the transfer can be effected. It includes also the switching engine time required to place the serviceable car on the transfer track, classify the defective car for the shop, and to switch out the replacement car for forwarding.

The total time assignable to this category of switching service was derived by multiplying the number of cars involved at each transfer point by the required aggregate switching engine minutes per car, using an average figure at those yards not covered by the study programme. Data pertaining to the number of cars was obtained from an analysis of Regional records for the year 1958.

Switching time consumed in the handling of defective cars not requiring a transfer of lading was included directly in the minutes relating to the other categories of switching service performed.

Total Switching Minutes - All Categories:

The switching times developed for each of



these categories were then combined to give the total minutes for each terminal and for all terminals together. The totals thus obtained (Statement NR 2-7) represent the aggregate minutes of switch engine time involved in the handling of the basic study traffic at all yards and terminals served by regular switching assignments.

(c) Analysis of the railway primary expense accounts to determine the variable operating expenses.

Railway expenses are incurred at four levels; Division, District, Region and Headquarters. They are recorded by accounts as set out in the "Uniform Classification of Accounts" authorized by the Board of Transport Commissioners. Division, district and regional expenses were taken from the records of the three Regional Accounting offices at Moncton, Toronto and Winnipeg. Headquarters expense was obtained at Montreal. These expense data were collected separately for labour and material for the years 1956, 1957 and 1958. Any labour charges directly related to capital expenses were removed from each of the expense accounts concerned. Material charges related to capital expenses are accounted for separately and do not appear in the operating expense accounts.

Since the motive power used by the Canadian National in 1958 was to a large extent diesel and steam locomotives will be completely replaced in the near future, diesel costs were used throughout.



The expense data were then all stated in December 1958 wages and material prices by adjusting for changes in wages and in the Canadian National material price index.

These accounts were functionally grouped to analyze their variability with traffic volume and size of plant, and were divided into three categories:-

(1) Expense accounts to be analyzed by statistical regression methods

(2) Direct expenses and those expenses to be analyzed by individual studies

(3) Expense accounts which are not affected by the movement of Western grain traffic or are related to steam operation

Expense Accounts analyzed by statistical regression methods:

<u>Road maintenance</u>	<u>Railway expense account numbers</u>
Track and roadway	202, 208, 212, 214, 216, 218, 229, 269, 270, 271, 273, 281
Fenses, snow sheds and signs	221
Station and Office buildings	227
Fuel and water stations	231
Shops and engine houses	235
Power plant systems	253
Removing snow, ice and sand	272
Superintendence and miscellaneous	201, 274, 275, 276, 277



<u>Transportation</u>	<u>Railway expense</u> <u>Account numbers</u>
Superintendence and miscellaneous	371, 374, 410, 411, 414, 415, 416, 420
Train control	249, 372, 404
Station employees and expenses	373, 376
Yardmasters and yard clerks	377
Yard locomotive engine house and other expenses	386, 388
Yard other expenses	389
Train locomotive other supplies and engine-house expenses	398, 400

Direct expenses and those expenses to be analyzed by special studies.

Road Maintenance

Rail communication systems, maintenance and operation	247, 407
Road property - depreciation	266

Equipment Maintenance

Diesel locomotives	311A
Freight train cars	314
Work equipment	326
Shop and power plant machinery	302
Superintendence and miscellaneous	301, 306, 329, 332, 333, 334, 335
Other equipment and machinery - depreciation	305
Rolling stock and vessels - depreciation	331



Direct expenses and those expenses to be analysed
by special studies

<u>Traffic</u>	<u>Railway expense account numbers</u>
Total traffic expenses	351,352,353,354 356,357,358,359
<u>Transportation</u>	
Yard trainmen and enginemen	378,380
Yard switchmen	379
Yard locomotive fuel and power	382
Train enginemen and trainmen	392,401
Train locomotive fuel and power	394
Train other expenses	402
Loss and damage - freight	418
<u>General</u>	
General officers, clerks and others	451,452,453,454, 455,458
Pensions	457
<u>Railway tax accruals</u>	
Other railways taxes	468
<u>Others</u>	
Joint facilities	278,279,336,337, 390,412,413,465, 466

Expense accounts which are not affected by the
movement of western grain traffic or are related
to steam operation

<u>Road maintenance</u>	<u>Railway expense account numbers</u>
Grain elevators	237
Wharves	241
Other structures	265



Expense accounts which are not affected by the move-
ment of western grain traffic (continued)

<u>Equipment maintenance</u>	<u>Railway expense account numbers</u>
Steam locomotives	308
Other locomotives	311B
Passenger train cars	317
Vessels	323
Other equipment	328
 <u>Transportation</u>	
Coal and ore wharves	375
Yard locomotive fuel and power	382
Yard locomotive water	385
Train locomotive water	397
Operating sleeping and parlour cars	403
Crossing protection	405
Drawbridge operation	406
Operating vessels	408
Loss and damage - baggage	419
 <u>Miscellaneous railway operations</u>	
All expenses	441,442,443, 446, 447,448
 <u>Equipment rents</u>	
All expenses	463,464
 <u>Express, commercial communications and highway transport (rail) operations</u>	
All expenses	470,471,472, 473,474,475, 480,481,482, 483,484,490, 491,492,493, 494,495



MR. McDONALD: Now, will you proceed and make any explanations you see fit and give reference to the page of your precis as you are doing it without reading your whole text.

A. All right. The first portion I would like to explain is on locomotive miles on page 13 of the precis. In that text we say:

"For each division the ratio of freight locomotive miles to freight train miles for 1958 was produced from company records."

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In discussion with American experts we found, from their suggestion, we should have just used diesel freight locomotive miles to diesel freight train miles to get an idea how many locomotive miles there were for each train mile. We have gone back over the study and recomputed the figure and it will appear in our final study as diesel freight locomotive miles to diesel freight train miles. There will be a comment on that further when we get to the summary tables.

Near the bottom of page 13 we have some six exhibits which are supplementary statements and I think each one of them speaks for itself, but they should go into the record as a separate exhibit. We start with NR 1-33, which becomes Exhibit 57-EE. This is a summary of the cars, tons and revenue by grain terminals. All of these six exhibits just give supplementary information, information which was used in the study.

MR. FRAWLEY: Perhaps this would be a good place for me to say -- I mentioned this to Mr. McDonald, but I want to make it very clear: I hope Mr. Bandeem realizes how essential it is to get all these changes to Mr. Banks and will, I hope, adopt some method of getting all this information to Mr. Banks.

THE WITNESS: Well, we have told him of any changes that he has requested, but it will be in the record.

MR. McDONALD: It is in the record.

MR. FRAWLEY: I do not propose buying



several copies of this record to send to Washington.

MR. McDONALD: Any changes that are being made we will get copies for you.

THE WITNESS: The additional exhibits and the text and whatnot will have to go as they are in the record, most of these came up through suggestions from Mr. Banks and Mr. Saunders.

MR. FRAWLEY: I understand that, but when he is doing his work it would be very useful to know whether you gave effect to any of his suggestions or not.

MR. McDONALD: Any changes in the statements we will have copies for you.

MR. FRAWLEY: Now, in NR 1-33 ---

THE ACTING CHAIRMAN: That is Exhibit 57-EE.
NR 1-34 is Exhibit 57-FF. NR 1-35, Exhibit 57-GG.
NR 1-36 is Exhibit 57-HH. NR 1-37 is Exhibit 57-II.
NR 1-38 is Exhibit 57-JJ.

---EXHIBIT NO. 57-EE: Statement NR 1-33.

---EXHIBIT NO. 57-FF: Statement NR 1-34.

---EXHIBIT NO. 57-GG: Statement NR 1-35.

---EXHIBIT NO. 57-HH: Statement NR 1-36.

---EXHIBIT NO. 57-II: Statement NR 1-37.

---EXHIBIT NO. 57-JJ: Statement NR 1-38.

MR. McDONALD: Q. That deals with the statements referred to on page 13?

A. Yes, it does. There were one or two



things on NR 1-37 which is Exhibit 57-II: that "milling in transit;" included in there as well as milling in transit is storage at government elevators because milling in transit - stopover charges is the 3 cents - and the other ones are storage at government elevators, the other charges. That is not clear in the table.

The other one is on statement NR 1-38, which is Exhibit 57-JJ, the revenue figure again should be adjusted to take out the inspection charges and it becomes \$28,568,398.

MR. COOPER: On 57-EE should the revenue figure be changed there as well?

THE ACTING CHAIRMAN: The inspection charges?

MR. McDONALD: NR 1-33, should the revenue figure be changed there?

A. Yes, it should and it will again reduce the final total to -- I don't have the figure right before me -- \$28,568,398.

MR. FRAWLEY: That is the total, is the change to be made in the column somewhere else?

THE WITNESS: Wait until I check on that and see where it was recorded. It would be in the first figure, that \$26,008,451 and it would come out of all of the revenues except the lakehead one. There would be a small reduction in each one of the other terminals -- traffic going to each of the other terminals except the Lakehead. We have not gone back and put it in on that basis but the total comes out again as \$83,000 plus.

Back on page 13 of the text of the precis



at the very bottom we have a paragraph which reads:

"To allow for the movement of company materials a percentage increase was applied to the grain traffic units being costed. This percentage increase was computed from the ratio of non-revenue freight net ton miles on the Western Region during 1958 to the total revenue freight ton miles on the Western Region during the same year."

The percentage we used was 4.445. Now, we have been queried by the American experts as to why we did not use the system average for this and the system average comes to 4.1 per cent, but when we studied the movement of OCS traffic we find there is a good deal more moving from east to west than west to east and if anything the percentage should go up to about 5.3 per cent if we attributed all the OCS miles for steel products moving on OCS. However, we have just used 4.445 per cent as it existed in the Western Region. This cuts out the movement of manufactured goods from Toronto and Hamilton in the Eastern Region, they really are for Western Region purposes.

Q. But you did not take those in?

A. No, those were not in.

Q. Now, is there anything further on your locomotive miles?

A. No, this is everything. This finishes the basic data part, the collection of basic data, and we move into a description of the field study which was determined for the switching minutes for the



different terminals in the west. This is fairly well set out in the precis starting on page 14; I think we can take it fairly well as read.

THE ACTING CHAIRMAN: Just on that, Mr. Bandeem, I take it you started your study in March?

THE WITNESS: That is quite right, yes.

THE ACTING CHAIRMAN: And you continued them till when?

THE WITNESS: The last one was August 22 in The Pas -- we appeared at the lakehead in June.

THE ACTING CHAIRMAN: When you say "we", how many of you, what staff were included?

THE WITNESS: There was a team of eight headed by an assistant superintendent from the Western Division and he had a team composed of two research people, then there would be five operating department people and they moved right across the Western Region, starting in Vancouver. The dates were so set that they got to the terminals when they were handling grain and by starting in March in Vancouver they had the grain moving out and by moving east they were able to get to the east just as the grain started moving to the lakehead.

(Page 2310 follows)



THE ACTING CHAIRMAN: Now, in connection with your study, too, Mr. Bandeem, what did you have by way of background data to go on and how much of this would be original data?

THE WITNESS: In this particular portion of the study?

THE ACTING CHAIRMAN: Yes.

THE WITNESS: This was almost all original data, and we had no information on the minutes spent switching for different kinds of classification. In any of our yards we know the switch engine minutes spent in the yard, but we don't know the different breakdown that the engineman do, so we went through each one of the terminals -- well, it was a very detailed study. We started in January of this year to set it up, and we did this in co-operation with the C.P.R.

THE ACTING CHAIRMAN: You did that from Montreal?

THE WITNESS: We had people come in from the Western region to Montreal and we discussed the problem, because you run into a great many problems, and the first thing you have to be assured of is the co-operation of the men and their union. I might add that we got complete co-operation from them.

THE ACTING CHAIRMAN: You went into the field in March and finished in August?

THE WITNESS: Yes.

THE ACTING CHAIRMAN: And then did you



work later in correlating the information in Montreal?

THE WITNESS: Actually we tried to have it correlated before we left the field, because it had to be in fairly final form, because these people have their own terminology for switching and you have to make certain you understand this. So this was held from Wednesday to Saturday, and on Saturday night we sat down. We supplied them with a car, so they had facilities.

THE ACTING CHAIRMAN: Then I take it there was some overtime?

THE WITNESS: Yes, they had to work on a 24-hour shift, because the yard works on a 24-hour shift, and each time anyone went on duty, the yard foreman, we gave him a card, and when he came off we had something written on there to make sure that he had accounted for all of his time. This is one of the reasons that we were four days in each terminal, and we thought it was better to spend four days in the terminal and talk to each of the men and foreman as they came off duty and go over every form with them. We feel we got pretty good results.

The otherthing is that we told the men we were not doing this as an efficiency check, because in any yard operation, as I understand it, anyway, there is a good deal of idle time which can't be avoided. We had no idea to use this as a check on the men, and we made this very clear



to them. So on their cards they filled it out and they put in their idle time, and that is prorated idle time over the field. I think non-productive is a better term; I don't like "idle time". We never summarized it for any particular yard and we have never used it.

THE ACTING CHAIRMAN: Go ahead, Mr. McDonald.

MR. McDONALD: Q. You were speaking particularly there to field studies to determine the time in switching traffic?

A. Yes, I am talking about field studies exclusively now. We started in January, although we didn't get into the field until March; it took from January until March to get this thing organized, to train the people and get them going, and so we did have these people tied up for over six months. As a matter of fact, we had the assistant superintendent in charge of all this, and has been with us all along, to make sure we were utilizing the data correctly.

We finished the main part of the study in June and we had to wait until August to get the traffic moving to Churchill. I believe the first ships call at the latter part of July in Churchill, so you are not into the real movement until August, and we actually had the operation at Churchill. They only take it in when there is grain moving, so you could see we had people tied up on this particular phase of it.



Q. Yes. Then there was the other phase that you have gone through before, getting the revenues and the ton miles and the train miles, and so on. That was a different operation?

A. Yes, that was a different operation. That was started again in the first part of the year, and we have had -- let me see -- at least four people all the time, and then we borrowed a lot of people from the other departments. For the milling in transit we had some 20,000 waybills to go through, and we had to match them with the inbound and outbound waybills, etc., and we took people in the field for this and it took a tremendous amount of time and they had to work overtime on this.

Q. That was a different section; that was under Mr. Dowling?

A. Yes, that is right.

Q. And after they got this material back to Montreal, was there some other work done on it?

A. Yes. These four people have been working continuously almost every night, and have since early summer, on this summarizing of it, getting it together and correlating it. We didn't survey all the terminals in Canada, because that would be a very difficult job. There were some 34 terminals, and we studied some 18 of them, and on two of them we were able to get the data in another fashion; in Churchill and Victoria we were able to get the data directly from them. We



took all the large terminals and representatives of the medium-sized and smaller terminals. Just as an example, we took all the principal destination and intermediate terminals for grain and related traffic, including Vancouver, Prince Rupert, Edmonton, Saskatoon, Winnipeg and the lakehead, and we took the traffic where the C.P.R. was switched, Edmonton and Calgary, and we included Winnipeg, Saskatoon and Edmonton; and in the Alberta district we took two smaller terminals, Jasper and Hanna, and in the Saskatchewan district, Prince Rupert, North Battleford and Melville, and in Manitoba we took six smaller terminals, and these included Hudson Bay and The Pas, which is on the Churchill route, and Rainy River, Kamsack, Brandon and Dauphin.

On the timing we did start in Vancouver and moved east, and by doing this we were able to get into the terminals. The grain was moving to the lakehead, and the only place we ran into a problem was Saskatoon, and we had to delay it for two weeks because there was a sort of bottleneck when we arrived, there was no grain moving, so we waited until there was grain moving.

I would like to go over the exhibits and make sure they all go in in order. We go to NR2-1. The significance in change in our own internal numbering is that this portion of the study fell under a different individual.

Q. I might explain our system of numbering. "N" is for National, to distinguish



from C.P.R.

A. That is right.

Q. That deals with the part of the study you dealt with up to this morning?

A. Yes.

Q. Then when you get into 2, NR-2, that deals with the field studies to establish your switching data?

A. Yes, and 3 deals with summation and costs. "R" stands for "Research Department". NR 2-1, which will become 57-KK, is an example of the bulletin which we sent out to yards. One of our problems -- not problems; it could have been a problem if we didn't get the co-operation of the local union people involved, so that at each terminal we made a point of talking to them and getting their co-operation.

---EXHIBIT 57KK: Statement NR 2-1.

NR 2-2, which becomes 57-LL, the two pages of it, is where they recorded their information. This is put on a hard cardboard with a crease down the centre so that the man could bend it over and put it in his hind pocket and also write on it in pencil. It was a stiff cardboard, and this was designed on the instructions from the people in the field to make it easier for the man to fill out his sheets.

---EXHIBIT NO. 57-LL: Statement NR 2-2.

NR 2-3, which is 57-MM, is just a recapitulation form, and this was filled in at the



yard before we came back, and it is summarized and the first column is "O" for overhead time.

---EXHIBIT NO. 57-MM: Statement NR 2-3.

NR 2-4 is another form, 57-NN, and it is just to summarize -- you see, NR 2-3, the previous exhibit --one of these is made out for each report. There were 900 of these, and they were summarized for each yard on this NR 2-4.

---EXHIBIT NO. 57-NN: Statement NR 2-4.

NR 2-5 is an example from the Edmonton study-- that is 57-00 -- and it is an example from the completed Edmonton study, showing the minutes per car spent in the different switching elements, and the switching elements are listed on the left-hand side, the first being classification at the four different points and then the transfer movements, industrial switching, and this gives you on the right-hand column the minutes spent on this.

---EXHIBIT NO. 57-00: Statement NR 2-5.

You see, this exhibit is going to be used internally in the railway far more than just in a study of the Crow's Nest grain. We are going to use this, so we made a complete study of the operation of the terminal -- not just the operation in regard to grain -- because we are going to use it for costing purposes in the future, and we included everything that was done in



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2317

yard.

Statement NR 2-6 is a complete study.

(Page 2322 follows)



MR. McDONALD: Q. That will be Exhibit No. --

A. PP. It is a complete study from the lakehead. This is as we got them in in the field. We have a map to add to this because in reading through this it is a little bit difficult to understand, and even I am not familiar with it all.

MR. McDONALD: Just a moment. We might file this map and attach it to, as being part of, Exhibit 57-PP.

THE ACTING CHAIRMAN: That is part of that exhibit?

MR. McDONALD: Yes, part of the exhibit. Have you copies?

MR. FRAWLEY: Did you supply a map like that to Banks?

THE WITNESS: No, this is the first time we have had it.

MR. McDONALD: I will give you a copy right now, Mr. Frawley.

MR. FRAWLEY: Will this be 00?

THE WITNESS: No, it is just an attachment to Exhibit 57-PP. It is an aid in reading this exhibit. The exhibit is perfectly clear to someone who is familiar with the yard, but if you are not familiar with it you have no idea where the different elevators are located. It gives you some idea of the switching that was done at the lakehead.



---EXHIBIT 57 PP: Statement NR 2-6, and
"Sketch of Fort William and Port
Arthur area showing railway lines
and grain elevators served by
the C.N.R." added.

THE WITNESS: I will not go into a
long description of this, but at the lakehead we
had a hump yard in operation. It is a relatively
old hump yard in that it is not completely modernized,
and it is not used at all times. It is only used
when there are sufficient cars to justify its use.
We have actually recorded the total number of days
in which it was used in 1958, and the number of
cars of grain which were classified by the hump
yard, so when you are looking through the study --
you will find an example on page 3.

MR. McDONALD: Q. This is what exhibit?

A. Exhibit No. 57-PP. You will see
in the second line of figures we have: "Neebing:
Hump yard; minutes per car, 1.0". Well, this
was taken from the actual records, and when there
was not sufficient work to justify the use of the
hump yard -- I will not go out on a limb and say
how much that is, because I am not familiar with
the operation, but we have to have 300 or some
more cars there to be switched per day, and then
we use it. I believe in 1958 it was used on
approximately 80 days out of the total number of
days, but, again, in costing we knew the exact
number of cars of grain that went over the hump
yard, and the cost involved. In the text it is
explained, but it shows how we costed the grain.



In the latter part of this report each one of the possible moves is outlined, and it is the number of minutes, for example, to get a car into a particular elevator. That is outlined. We were able, by adding up the elements of switching needed to get a car into the elevator, to get the minutes taken in switching. This is very important in costing purposes.

Q. Where are you referring to there in your report?

A. This is at page 5 of the 28 pages.

Q. That is NR 2-6?

A. NR 2-6, which is Exhibit 57-PP.

Q. Yes?

A. If you will trace in the pages following this page 5 -- on the right-hand side of page 5 you will see A, B, C, D, etc. Well, the pages following outline how we got the minutes applicable to any one of the moves on page 5. You can take as an example the initial loads of grain to Paterson, which is D, and go over to page 9, and there is outlined the elements of switching which would be applied to that particular move into Paterson.

Q. The whole object was to determine the minutes taken in switching each car?

A. That is correct, yes. The next exhibit is Statement NR 2-7. There have been some changes in NR 2-7, and we have a revised statement in NR 2-7 to submit. The changes are of a minor



nature --

Q. Just a minute while I get it.

A. Well, I would like to number the new NR 2-7 as Exhibit 57-QQ.

Q. This is Exhibit 57-QQ, and it is in substitution of Statement NR 2-7?

A. Yes, that is correct. Again, Mr. Frawley, these have not been sent to Mr. Banks yet.

THE ACTING CHAIRMAN: Are the changes material, Mr. Bandeem?

THE WITNESS: No, they are not large. I will just outline the changes which are made here for you. The major change, and the one of significance, was at Vancouver and Victoria. We had to correct the distribution of traffic between these two points. In the initial instance, we had too many cars going over to Victoria --

COMMISSIONER ANSCOMB: What is that?

THE WITNESS: We had too many cars going over to Victoria. We had sent a certain number of cars into Victoria. There is a grain elevator in Victoria and we barged them across, and we had taken the figures of Victoria which was all grain arriving and not just the export grain, and it included some -- well, I believe, it was around 500 cars which we should not have had and which should have been terminated at Vancouver. When we made this correction we got a change in those two terminals in the minutes spent switching. Vancouver was increased by 12,963, and Victoria



was decreased by 9,487. In addition to this there were very minor changes at Winnipeg. As a matter of fact, one car which was classified as "milling in transit" by mistake was found to be a through car. At Moose Jaw we applied the classification to 556 cars which were coming out from mills and we had done this at no other place, and we were considering a car once out from the mill as being no longer chargeable to grain, and by mistake we put in classification time on 556 cars. This only amounted to 1,501 minutes. The changes are not material on the study.

MR. McDONALD: Q. The new statement, then, is Exhibit 57-QQ?

A. Yes, 57-QQ.

---EXHIBIT NO. 57-QQ: Statement NR 2-7 revised.

THE WITNESS: That is the finish of the field studies, and that final summarized statement, NR 2-7, or Exhibit No. 57-QQ, is the statement which was used to cost the amount of time spent at the different terminals.

COMMISSIONER BALCH: To what page does this bring you in your text?

THE WITNESS: That brings us up to page 25. Statement NR 2-7 is at the bottom of page 24. I have not covered everything that is in this preCis, but it can be taken as read, I assume.

MR. McDONALD: Q. That completes what you have to say on the field studies?



A. That is correct, yes. Now, I would like to move into a phase of it, which is the summarization of this basic data -- not summarization; that is not a good term, but it was the costing of this data. We now know the movements which were attributable to grain, ton miles, tons, car miles, empty and loaded, and we also know the switching time at the terminals. Then, we have to move into costing this; that is, putting a dollar value on these various movements which we have segregated as applying to Crow's Nest grain.

Q. That brings you to page 25 of your precis ?

A. That is correct.

MR. FRAWLEY: Is this where you come to the calculus?

THE WITNESS: Well, the calculus -- I am sorry; we do not use calculus as such in the study. We come to the regression analysis.

MR. FRAWLEY: I thought this use of the regression analysis was a form of calculus.

THE WITNESS: Well, it is not necessary to have calculus in order to be able to compute this. I would like to just state right here that I was quite amazed to hear the word "abstruse" applied to the regression. This may be from my background and training, but I would have thought that regression was straightforward mathematics, and I find it difficult to think of mathematics as being abstruse. This may be my misunderstanding



of the term, but --

THE ACTING CHAIRMAN: It is a new term, anyway.

THE WITNESS: Yes, it is a new term.

THE ACTING CHAIRMAN: I think the Commission is fortunate in that one of its members, Mr. Gobeil, when he took his Ph.D. at McGill, particularly studied this phase of mathematics, and Mr. Mann likewise in Toronto, and Mr. Platt has even given attention to it. So, the rest of us are very fortunate in that we have these gentlemen on the Commission.

MR. McDONALD: You have three experts on the Commission.

MR. SINCLAIR: We shall have to watch the cross-examination.

THE WITNESS: We are coming to the part that deals with regression now, although I want to caution you that the regression does not make up this much of the total cost. I mean, you can get the impression that all the costing was based on regression analysis, which is quite a fallacious concept, because a good deal of railway expenses are recorded in a fashion so that you can directly attribute them. I am thinking now of fuel and crews' wages, and this type of information, because once you know the number of trains, and know it by train run, then you can get the crews' wages that are applicable to that train run and apply them directly, and there is no need for a regression



or any other type of allocation.

It only becomes useful when you have a joint account such as roadway maintenance which you have a good many of our railway services utilizing. The roadway includes the passenger services, of course, and then all of the freight services. For recording purposes in our accounting system it is all recorded as a lump sum, and in an attempt to split it between the different services using it then we need something like multiple regression.

THE ACTING CHAIRMAN: That is when you try to unscramble it.

MR. MAURO: I wonder if in the final analysis it might not be time-saving if this phase of Mr. Bandeem's study weren't read by Mr. Bandeem.

THE ACTING CHAIRMAN: Yes, it would probably be better to do that.

THE WITNESS: Very well; I am starting at the top of page 25. This is the analysis of the railway primary expense accounts to determine the variable operating expenses.

Railway expenses are incurred at four levels; Division, District, Region and Headquarters. They are recorded by accounts as set out in the "Uniform Classification of Accounts" authorized by the Board of Transport Commissioners. Division, District and Regional expenses --



MR. McDONALD: Q. Just a moment. Have you a copy of this uniform classification of accounts? I do not think we have.

THE ACTING CHAIRMAN: I think we can get those.

THE WITNESS: Yes, I believe they are available from the Queen's printer.

THE ACTING CHAIRMAN: Yes, I think most of us have them.

MR. SINCLAIR: Copies have been supplied to our American friends.

MR. McDONALD: So we do not need to clutter the record by putting in that document.

THE WITNESS: It is important that they read these classifications.

THE ACTING CHAIRMAN: We have read them before.

THE WITNESS: I did not mean the Commission, but I meant the people down in the States because we have been getting a number of questions which on a careful perusal of this would not have been necessary. It is similar to the American one, but it is different in important ways, and some of the things we have been asked for are just not available in Canada, albeit they are down in the United States. It is quite important that they study this carefully.

MR. FRAWLEY: At so much a day.



THE WITNESS: Division, district and regional expenses were taken from the records of the three Regional Accounting offices at Moncton, Toronto and Winnipeg. Headquarters expense was obtained at Montreal. These expense data were collected separately for labour and material for the years 1956, 1957 and 1958. Any labour charges directly related to capital expenses were removed from each of the expense accounts concerned. Material charges related to capital expenses are accounted for separately and do not appear in the operating expense accounts.

Since the motive power used by the Canadian National in 1958 was to a large extent diesel and steam locomotives will be completely replaced in the near future, diesel costs were used throughout.

The expense data were then all stated in December 1958 wages and material prices by adjusting for changes in wages and in the Canadian National material price index.

These accounts were functionally grouped to analyse their variability with traffic volume and size of plant, and were divided into three categories:-

- (1) Expense accounts to be analysed by statistical regression methods.
- (2) Direct expenses and those expenses to be analysed by individual studies.
- (3) Expense accounts which are not affected by the movement of western grain traffic or are related to steam operation.



THE ACTING CHAIRMAN: And you list the accounts there?

THE WITNESS: That is right.

THE ACTING CHAIRMAN: They can be taken into the record.

THE WITNESS: There are one or two changes that should be made.

Expense accounts analysed by statistical regression methods

<u>Road Maintenance</u>	<u>Railway expense account numbers</u>
Track and roadway	202,208,212,214, 216,218,229,269, 270,271,273,281
Fences, show sheds and signs	221
Station and office buildings	227
Fuel and water stations	231
Shops and engine houses	235
Power plant system	253
Removing snow, ice and sand	272
Superintendence and miscellaneous	201,274,275,276, 277
<u>Transportation</u>	
Superintendence and miscellaneous	371,374,410,411, 414,415,416,420
Train control	249,372,404
Station employees and expenses	373,376
Yardmasters and yard clerks	377
Yard locomotive engine house and other supplies	386,388
Yard other expenses	389
Train locomotive other supplies and enginehouse expenses	298,400



Direct expenses and those expenses to be analyzed
by special studies

Road Maintenance

Rail communication systems,
maintenance and operation 247,407

Road property - depreciation 266

Equipment Maintenance

Diesel locomotives 311A

Freight train cars 314

Work equipment 326

Shop and power plant machinery 302

Superintendence and miscellaneous 301,306,329,332,
333,334,335

Other equipment and machinery -
depreciation 305

Rolling stock and vessels -
depreciation 331

Traffic

Total traffic expenses 351,352,353,354,
356,357,358,359

Transportation

Yard trainmen and enginemen 378,380

Yard switchmen 379

Yard locomotive fuel and power 382

Train enginemen and trainmen 392,401

Train locomotive fuel and power 394

Train other expenses 402

Loss and damage - freight 418

General

General officers, clerks and others 451,452,453,454
455,458

Pensions 457



Railway tax accruals

Other railway taxes 468

Others

Joint facilities 278,279,336,
337,390,412
413,465,466

Expense accounts which are not affected by the
movement of western grain traffic or are related
to steam operation

	Railway expense account numbers
<u>Road maintenance</u>	
Grain elevators (Eastern Canada)	237
Wharves	241
Other structures	265
<u>Equipment maintenance</u>	
Steam locomotives	308
Other locomotives	311B
Passenger train cars	317
Vessels	323
Other equipment	328
<u>Transportation</u>	
Coal and ore wharves	375
Yard locomotive water	385
Train locomotive water	397
Operating sleeping and parlour cars	403
Crossing protection	405
Drawbridge operation	406
Operating vessels	408
Loss and damage - baggage	419



Miscellaneous railway operations

All expenses 441,442,443,
446,447,448

Equipment rents

All expenses 463,464

Express, commercial communications and
highway transport (rail) operations

All expenses 470,471,472,
473,474,475,
480,481,482
483,484,490,
491,492,493,
494,495

The groups of expense accounts to be analysed by
statistical regression methods

In order to conduct statistical analysis, traffic volume and plant size statistics for the years 1956, 1957 and 1958, were collected, by divisions, from company statistical records. All expenses, plant size and traffic volume figures were shown as averages of the years 1956, 1957 and 1958.

I should add that when we talk about plant size what we mean is miles of track and fences, and this type of information for each division, and traffic volume refers to gross ton miles of freight and passengers over the division, or train miles; any type of performance measured.

These data, for divisions and districts, were used to construct functional relationships called models. These models explain variations in expenses which are related to variations in the volume of traffic (the traffic output variable)



and in size of the railway plant (the size variable). These models show the cost associated with each unit change in traffic volume and plant size with other effects taken into account.

COMMISSIONER PLATT: I don't get the significance of "models".

THE WITNESS: That is a technical term which we probably should not be using.

COMMISSIONER PLATT: "Hypothesis" would be the same?

THE WITNESS: That is quite right. That is a term that slipped in and is greatly over-used and hypothesis is probably the correct term.

Several possible relationships between each railway expense group and various traffic and size variables were tested. These models, numbering in the hundreds, were computed by least squares regression on the Canadian National IBM 650 electronic computer. The two measures of the usefulness of each model were; the coefficient of determination, or R^2 , which measures the per cent of variation in expenses explained by the model; and the t test which measures the significance of the individual traffic and size variables included in the model. The application of these two tests determined the model which best explained the group of accounts being examined. The unit variable costs associated with the traffic and size variables in these selected models were the unit costs used in the computation of variable costs.



What this paragraph sets out is what we were discussing previously; we were trying to -- I believe I used the term "unscramble" the costs and associate them with the particular variables, and by using these regression models we get a coefficient, and this was used as a unit cost. Now, a straightforward example of this, and one easily understood, is the maintenance of fences, and this is a separate account, and we found that the maintenance of fences was directly related to the number of miles of fences, but there was a certain portion that you couldn't distribute -- in other words, on a division basis there were some costs that can be called the threshold cost, but it is a cost which is not associated with the miles of fences on the division, but then you find that the rest of the cost varies with the number of miles of fences, and this came into the study on the solely related branch lines when we were trying to estimate the amount of maintenance spent on the fences, along the solely related branch lines.

For expense groups 253, "Maintenance of power plant systems", and 272 "Removing snow, sand and ice", no significant relationship was found between expenses, traffic volume and size of plant.

Expense groups with unit costs obtained by the regression analysis are listed in Statement NR 3-1.

I will just read the next paragraph before coming to that. We have included NR 3-1 and NR 3-2 together.



Since the unit costs were calculated using division expense data, a further calculation was required to include relevant district, regional and system expenses. The adjusted unit costs are shown in Statement NR 3-2.

Now, this statement has been revised and we are submitting new statements.

THE ACTING CHAIRMAN: I think that will be 57-RR.

THE WITNESS: Exhibit 57-RR, yes.

THE ACTING CHAIRMAN: And that covers both 1 and 2?

THE WITNESS: That is right.

MR. McDONALD: We will put this in as an exhibit, then.

---EXHIBIT NO. 57-RR: Statements NR 3-1 and NR 3-2.

MR. FRAWLEY: These have to go to Washington, too?

THE WITNESS: Yes, they do.

THE ACTING CHAIRMAN: Is there any material change?

THE WITNESS: If I could just run through the changes made on the sheet. There is one change which I would call material on page 1, it is the account at the very bottom of the page, "Shops and engine houses, account 235." We had originally run regression model accounts and total locomotive miles, and related those to shops and engine house expense, and at our meeting in Montreal with the



American experts they suggested another model, which we didn't have the data for immediately available, but we did collect it and have run it and it relates shop and engine house expense to direct equipment maintenance and engine house expense, and it gives very good statistical reasons and we adopted that. It doesn't make too much change in the overall cost, but it is a change in this particular model.

On page 3 of the exhibit we made a correction which is, in fact, in the adjusted unit variable costs, and was an error on our part in the first case, and that is under "Yardmasters and yard clerks, Account 377," which is four lines up from the bottom of the page, and the adjustment factor as put in is one of the unit variable costs taken from the regression analysis, and those two figures were incorrectly recorded, and we went back and put them in in their proper place; it has no place in the final adjusted unit variable cost..

I might just add as a comment of explanation that the final column is the unit variable cost which we applied against the basic data, which is the time switching and the other data which we find associated with grain.

THE ACTING CHAIRMAN: Is there any explanation for the value of that being lower in respect to water and fuel stations?

THE WITNESS: No, this just means that we didn't get as good statistical fit there, but it is still satisfactory, we are still happy with it. It



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(McDonald)

2343

is significant, but not as good a one; in other words, this model isn't as descriptive -- we don't get as much change in as we would like to have had, but there is no significance to it.

THE ACTING CHAIRMAN: What value of "R" would you consider satisfactory?

(Page 2346 follows)



A. This depends on a good number of things. You have to know the number of observations you have and there are tests to tell you whether our square is significantly different from zero which is the first test. In this case I think you can guess a "R" value as low as -- probably around 50 which would still be significant. However, I would prefer if I got one of 50 to hunt for something better if I could find it but you could probably establish that as a "R" value around 50 was significant. However, fortunately that was the lowest one we had, the one you selected, water and fuel stations and it was well above the 50. In that particular case the total expenses being charged to grain resulting from that are not high, as a matter of fact, if I can just find that for you -- it is only a total of \$64,000 out of the \$40 million-odd. In this case while the "R" is not as high as the others are of course, you look into the highest "R" possible as an objective and you would not have any serious error. If it was one of the more important ones you would look further to try and see a better explanation.

THE ACTING CHAIRMAN: We will have a short recess now.

--- Recess.

THE ACTING CHAIRMAN: Very well, gentlemen, shall we continue?



MR. McDONALD: Q. Now, Mr. Bandeem, on this Exhibit 57-RR which you have been dealing with --

A. What I would like to explain about it is, these are results of a great many tests of different hypotheses and what we are doing in essence is quite simple. You simply hypothesize that a certain relationship exists and proceed to test it. It is a very simple procedure. You could make a hypothesis that the ceiling was black and you proceed to test whether it was or not. This is more or less the type of procedure. Of course, I hope you would find the ceiling was not black but I suppose it depends on your definition of black. This is what we are trying to do here. We hypothesize in the case of fences that the maintenance of fences was related to the miles of fences along the right-of-way and we went ahead to test it to see whether it was and the results we got satisfied us that there was a relationship between these two. Accordingly, we used the cost which was unit variable cost --

Q. Looking at Exhibit 57-RR, you have under the "variable" down about the middle of the page, "carloadings l.c.l.". Then you carry it out to the "adjusted unit variable cost" to \$4.8619. What does that mean? You are not charging l.c.l. traffic to grain, are you?

A. No. This is a second page?



Q. No, I --

A. Carloadings l.c.l.?

Q. The first page.

A. I am with you now. No, we are not charging it to grain. There was no charge for station and office buildings put against grain. This is the maintenance of stations and office buildings. We could not find there was any relationship in Canadian National between the maintenance of stations and office buildings and the movement of freight traffic. Now, here is a case where we probably understate the cost. There is some relationship but there was no significant relationship picked up in our studies. Actually it is not too unreasonable when you consider in an average station the two things take up a lot of room and a lot of maintenance would be your passenger waiting room and the l.c.l. freight sheds.

Q. You did not get my point. When you carried this over from your carloadings l.c.l. to your adjusted unit variable cost --

A. No, we are not using this in the study. This was in and we just put it in for the information of the people who are studying it but it is not included in the cost of grain at all.

THE ACTING CHAIRMAN: This is just extra?

THE WITNESS: Yes, and it was just one of the factors which we found explained the cost in station and office building maintenance. We did



not put that in because passenger miles you could not attribute to the grain or carloadings l.c.l. What we are saying is the maintenance of stations and office buildings is not related to the traffic. When we get over to the employees we find they were --

MR. McDONALD: Q. I just wanted a figure. That is not taken into the costing of grain but that is the adjusted unit variable cost on carloadings l.c.l.?

A. That is right. We felt if we left this off the exhibit we would be asked what happened to the maintenance of stations and office buildings so we included it to forestall the questions but it was not used in the study. Similarly in the next page we have an l.c.l. and carloading and the l.c.l. figure there is not used in the study but the carloading one is.

MR. FRAWLEY: None of these on Exhibit 57-RR were used?

THE WITNESS: No, that is not correct. There were just certain ones like on page 1 of that, the only ones that were not used were the passenger car miles, carloadings l.c.l. If you look at the second column entitled "variable" you will find what we were trying to cost and you go down and see "miles of roadway". If you look to the right you find it was \$893.37 spent on maintenance per mile of roadway and this is not associated with grain at all because it is in the nature of a



constant cost. The only place it comes into play is in the solely related branch lines but on the main lines this expense is there whether you run grain over it or not so that is in the nature of a plant size variable. The next one "gross ton miles in freight trains" the cost is 15 cents per thousand gross ton miles. This will go directly in because we know the gross ton miles from our basic data study and we put this directly in relation to the cost of grain carrying the gross ton mile of grain at 15 cents. Similarly with the "yard locomotive miles", we have gone to a good deal of trouble to translate their minutes into miles in a factor of 10 minutes per mile. This is a standard method of accounting and we translate the yard locomotive minutes into yard locomotive miles to show the one mile is equal to 10 minutes.

COMMISSIONER MANN: Assuming six miles per hour?

THE WITNESS: Yes, it does not really matter so long as we have them on a consistent basis. We could have called these yard locomotive minutes and multiply it by ten and would have had absolutely the same in each case because it is still on the division basis. What we say is that is 78 cents per yard locomotive mile for maintenance and this is a method we get for costing the portion we were putting in the analysis. We have excluded, as has been pointed out, things like passenger car miles because there is none of it



attributable to grain and the l.c.l. So far as I know those are the only ones included on this sheet which are not attributable to grain.

MR. McDONALD: Q. Have you got to the point where you were in the text now?

A. Yes, page 29.

Q. You are coming to direct expenses?

A. Yes, direct expenses and those expenses to be analyzed by individual studies. The first one is diesel locomotive maintenance. Canadian National keeps records of the cost of repairs and miles operated by diesel units, by type and age. These expense records were extracted for the five-year period 1954-1958, and adjusted to the wage and material price level prevailing in December, 1958. For the first three years in use the average repair cost per unit mile of a diesel locomotive showed a steady increase, tending to level off after the third year. Since the costs for this study are calculated for a fully dieselized fleet, the average repair cost per unit mile for all diesels over three years old was computed separately for yard and freight units and used as the unit repair cost for total diesel repairs. This is Statement NR 3-3 which now becomes Exhibit 57-FF.

---EXHIBIT NO. 57-FF: Statement NR-3-3 revised.

Q. This is a revised statement?

A. Yes, this statement is revised.



Q. This is a revised statement?

A. Yes, this statement is revised.

COMMISSIONER MANN: Mr. Bandeem, how old are your oldest diesels?

THE WITNESS: I would have to check the record but I do think we have some that are around 10 years. However, the total fleet averages for road diesels are extremely young, I think it is around three years but this is merely because we have purchased so many in the last few years. The whole point of this particular part of the study was if we took the repair costs as they exist now for diesels we would be drastically understating repair costs when we were fully dieselized.

COMMISSIONER MANN: That is why I was asking you the question.

THE WITNESS: And since we have treated the study as being completely dieselized without any steam we feel that since we are putting the full costs of all this in on a dieselized basis, we felt we should put the repair costs in as it would be when we are fully dieselized. Now, we do not have any information on this because we do not have a fully dieselized fleet and the average age of our fleet -- this is just a guess -- our figures for our road are slightly over three years and we feel when it is fully dieselized, I believe the figure we use for depreciation before the Board is 20 years for road and 25 for yard and the average age for these, I assume, would be



between 10 and 12 years.

MR. McDONALD: Q. This is when you are completely dieselized?

A. Yes. In an attempt to get some idea of what the repair costs will be the only data we had was the experience we have had and the first, second and third years had increased rather rapidly. This is on the Exhibit 57-SS and for our road unit it goes from 9.406 to 24.385 and over the years the average is 31.794. Now, I would assume from looking at this study that the 31.8 is conservative because while it levelled off after the third year that there was a tendency upwards. When we have been dieselized 20 years we would know but just now we do not know, we have not any experience with them and we will not have any until, I suppose, another 10 years from now. We are taking this 31.8 cents per unit mile for the road units and my own feeling is that this is conservative if anything. At the bottom of the sheet where we have "road unit repairs", the unit miles change from 8,140,263 to 7,933,928. This was in line with something I have already mentioned in the text where you can compute the unit miles, we had used the number of units and the number of locomotives, the locomotive train on a basis of both steam and diesel and when we put it on a diesel basis you get fewer locomotive miles per freight mile so we had to take this adjustment into account. It reduces our total repair cost by about \$65,000 for road



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2354

and the same thing for yard. We have a reduction in connection with NR 2-7 which is Exhibit 57-QQ, this is when we changed the yard switching minutes but since we used these repair costs in the final studies we should put in a change -- record the change.

(Page 2358 follows)



MR. MAURO: Mr. Bandeem, that 11 cents on fuel costs per yard locomotive mile, that is 11 cents per mile?

THE WITNESS: It would be per gallon. Wait, I will check on that. No, it is per mile. The cost per gallon is $13\frac{1}{2}$ cents, and that is what the cost was in the Western Region, and this excludes the American lines. The cost per gallon is 13.5, and the gallons per mile is .823, and that was obtained in the same fashion as the repair costs. In other words, we took the average over the three years, the fuel consumption for yard locomotive units, and this 13.5 cents is the price paid in the Western Region in 1958, and that does exclude our Duluth-Winnipeg system, which had a different priced fuel. It could have had; I won't swear it did have.

Freight train car maintenance: During the last half of 1956 and the first half of 1957 the Canadian National conducted a twelve months' survey of repairs to a sample of more than 500 box cars. Actually it was over 600, the number. I think it was 640 some odd. It is one per cent of our total fleet. During this period, a complete record was kept of the cost of all on-line and off-line repairs to these cars for both running and major repairs. Studies conducted by the Interstate Commerce Commission show that box car repair expenses are 70 per cent related to car miles and 30 per cent related to car days. Accordingly, 30 per cent of the average sample box car repair cost, adjusted to December 1958 wages and material



price levels, was divided by 365 to obtain an average repair cost per day. The remaining 70 per cent of the average repair cost was divided by the average annual car miles per car to obtain an average repair cost per car mile. To obtain total car repair costs, these average repair costs were multiplied by the car miles and car days related to the study traffic, which is NR 3-4, which I don't believe changes. That will be Exhibit 57-TT.

---EXHIBIT NO. 57-TT: Statement NR 3-4.

COMMISSIONER BALCH: What are your on-line and off-line repairs?

THE WITNESS: Well, when the car is off-line we get the repair bill from ---

COMMISSIONER BALCH: Your own car on a foreign line?

THE WITNESS: Yes, which would give us the off-line repair cost. We were able to sort it out. You only use the on-line repairs. We took every one of our box cars, we numbered them serially, and we took everyone ending in 51, I believe -- 50, I am sorry -- and this gave us a one per cent sample, it gave us the different age groups, the type of cars. It is debatable in certain circles that it is an improvement, but it is an improvement in the sense that we got a complete sample of our fleet and the performance, and it is a replica of our fleet for the year. It was done by issuing repair costs. The costs of A.A.R. billing is an agreed cost



between the railways for inter-rail settlements. We used the actual units, the time spent on the cars, and it was -- we only carried it out for one year. It had a purpose other than this, but it fitted in very nicely. On using this split of 30-70, which is what ICC uses in the United States, they say that 30 per cent of the costs accrue because you own the cars. Actually in the case of Canadian National it would have matter only slightly, it would have had only a very small effect on our repair costs if we had taken it only on a car day basis.

Work equipment maintenance

Work equipment maintenance expense, Account 326, was related to the road maintenance expense in accounts 201, 202, 208, 212, 214, 216, 218, 229, 269, 270, 271, 272, 273, 274, 275, 276, and 281. The average system annual expense on work equipment was divided by the average system annual expense total for these road maintenance accounts to obtain the unit cost for work equipment maintenance per dollar of expense in the road maintenance accounts. The cost of this item for the study traffic was computed as the unit cost per dollar multiplied by the dollars in the road maintenance accounts variable with the study traffic.

Shop and Power plant machinery maintenance

Maintenance of shop and power plant machinery expense, account 302, was related to the major repair costs as contained in accounts 308, 311A, 311B, 314, 317, 323, 326, and 328 in the same



manner as above to obtain the cost of maintenance of shops and power plant machinery variable with study traffic.

Superintendence and miscellaneous

The superintendence of equipment maintenance, dismantlings and miscellaneous expenses in accounts 301, 306, 329, 332, 333, 334 and 335 were related to the other equipment maintenance expenses contained in accounts 302, 308, 311A, 311B, 314, 317, 323, 326 and 328, in the same manner as above to obtain the expenses for superintendence, dismantling, etc., variable with study traffic.

Yard trainmen and enginemen

Yard trainmen and enginemen expense accounts 378 and 380 and total switch engine minutes are reported on the Canadian National for each terminal. Actual crew wage cost per switching minute, for each terminal, was derived from these data. This cost was multiplied by the study traffic yard switching minutes at each terminal to obtain the cost, and this was in Statement NR 3-5, which is devised to take into account the change in switching minutes, which I have already discussed, at Vancouver and Victoria.

---EXHIBIT NO. 57-UU: Statement NR 3-5.

THE WITNESS: As you can see on looking at that, the net change in dollars is \$458, so it is really not a significant feature in the cost study at all. However, it does make it more accurate to include this.



MR. McDONALD: Q. Any further explanation of this?

A. No, I think it is self-explanatory. We just used the crew wages per minute and you get a total wage cost over all the terminal.

COMMISSIONER BALCH: The various difference in the crew wage minutes -- that would be the crews handling more grain than in other yards?

THE WITNESS: Yes, the crew wage is the actual wage paid in the yard for the minutes, and why they do vary between yards I frankly can't tell you.

COMMISSIONER BALCH: I was think about it, and I was wondering if it was because you were basing it on the handling of grain.

THE WITNESS: No. We took the actual crew wages paid in the yard and we took the switching minutes, and you get this average. I am not familiar with how they pay the crews in the yards, whether there is a variation in the yards or not. There is a suggestion here it would probably be overtime payments and other extra payments, which vary from yard to yard.

COMMISSIONER BALCH: Yes, I see; that could be.

THE WITNESS: But these are the actual costs as they existed in the yards. We had that from company records.

Yard switchmen

Only that portion of yard switchmen expense which occurred at the Lakehead (where it is



directly related to the operation of the hump switching of grain) was included in the variable cost. This expense at the Lakehead in 1958 was \$19,504.

Yard locomotive fuel and power

Yard locomotive fuel and power expense, account 382, is recorded by the Mechanical Department on the records already referred to for diesel repair costs. As with diesel repairs, the average gallons of fuel consumed per switch engine mile was calculated for yard engines over three years old, and we have already discussed this in connection with Statement NR 3-3, which was 57-SS. This was multiplied by the December 1958 cost per gallon of diesel fuel on the Western Region to arrive at a unit cost of fuel per switch engine mile which was multiplied directly by the switch engine miles related to the study traffic.

Train enginemen and trainmen

Train enginemen and trainmen wages, accounts 392 and 401, were computed for each train run in the Western Region for both through freight and wayfreight, separately. Wage rates are on a per mile basis. This necessitated the calculation of the constructive miles for each train run. The constructive miles consist of the actual road miles; plus arbitraries (the additional payments guaranteed each employee for each trip); plus the time detained prior to departure from the initial terminal and time detained on duty after arrival at the final terminal; all in accordance with existing agreements with



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2363

these employees. The actual road miles are recorded in the working timetables; the arbitraries to be paid each trip are set out in the working agreements with the unions; and the average terminal detention time at each end of a trip was obtained from company records. Constructive miles for each train run were separately produced for the engineman, fireman, and trainmen.



Wages for vacation and other non-productive time, as recorded in the actual payroll records for 1958, were also taken into account.

COMMISSIONER BALCH: Is that part of the feather-bedding?

THE WITNESS: Well, I do not know whether that is the case or not. I think it is, as in the case of the switching, the fact that you have a total non-productive time.

The total crew wage cost was computed by adding the number of trains per train run times the wage cost per ton for all train runs.

Now, a train run is not exactly the same as a subdivision. It can include parts of several subdivisions, but it is -- it would average about 100 miles, I would think, and we had to go to each one of them in the Western Region to get this information because you have different conditions on them.

Train locomotive fuel and power: From company records of diesel fuel deliveries, of the miles operated, of work performed and of time consumed between fuelings for individual diesel units; the fuel consumption for effort produced was computed. This was then combined with the known grade and other resistances for each subdivision by direction to arrive at fuel consumption per car mile by subdivision and by direction for cars of different dead and loaded weights. The fuel consumption per car mile is for the tons trailing the locomotive only. Similarly, fuel consumption per diesel unit



mile was deduced, by division, to account for fuel used to move the weight of each diesel unit. The December 1958 price for diesel fuel was applied to the total fuel consumption which was calculated for different weights of cars, by subdivisions and by direction, and for diesel units by divisions. Fuel cost per yard switching mile, explained previously, was used to compute the fuel cost for train switching.

A copy of a working paper is shown in Statement NR 3-6, which is the one in the back and which will be Exhibit 57-VV. This is just an example of a working paper, and I do not think it would necessarily benefit by explanation. This was put in more or less to be an aid to the experts who are going to be studying this.

---EXHIBIT NO. 57-VV: Statement NR 3-6.

MR. FRAWLEY: Mr. Bandeem, how is it so coincidental that on the Bonnyville you have 633 loads east and 633 loads west -- is that it? No, it is empties. You have the same number of loads east as empties.

THE WITNESS: I think, actually, that this form, as it is utilized -- frankly, I should have an explanation of it. I did know it completely at one time.

MR. FRAWLEY: Oh, yes. It is the same everywhere, -- the loads and the empties east.

THE WITNESS: You will notice that the east-west only applies to the car miles and not to



the loads and empties. The loads and empties are just the ones picked up and set off on the subdivision. It is not supposed to be east and west. What is east and west are the car miles. You go east and west to get the grade and the different conditions -- to get different grades you would have to go in the two directions -- and you would get the gallons per car mile. If we can take this whole subdivision, the Blackfoot subdivision, you will see in the east direction, loads, the gallons per car mile is 0.628 whereas in the western direction, loaded, it is 0.853 Now, I am not personally familiar with this proposition, but it would indicate that there was a division in the grade and a difference in the fuel consumption. This is just the total number of loads picked up along that subdivision, and the total number of empties set off, and they obviously would have to be the same.

Train switching miles, used with the unit cost of fuel per yard switching mile to produce train switching fuel costs, was produced by converting train switching minutes on the basis of six miles per hour. Train switching minutes were computed by multiplying the number of cars set out and picked up by trains times the average minutes per elevator track switch obtained from the terminal switching studies.

Train other expenses: Train other expenses, account 402, are kept separately for freight, passenger and common on the Western Region. Only



the freight portion is treated as variable with freight traffic. These freight expenses cover the provision of grain doors, car inspection and lubrication, and train supplies. Each of these three items was analysed separately. The cost of providing grain doors, including the material cost and the labour involved in reclaiming used doors, for the year 1958, was obtained directly from statistics available on the Western Region and adjusted to the December 1958 price level. The average car lubricating cost per car mile for 1958 was obtained from company statistics and adjusted to the December 1958 price level.

I might say that when I get to the third from last exhibit you will see a summary which I can just run through, and the part we are doing here will become much clearer.

THE ACTING CHAIRMAN: Probably we could go to summary now.

MR. McDONALD: Yes, and take this as read.

THE WITNESS: I think it will be beneficial to go through this.

THE ACTING CHAIRMAN: I think after page 35, particularly.

THE WITNESS: Yes. I think, actually, if I go through it with the text -- there are one or two changes in the exhibits before getting to the summary which should be in, and which will be covered in the text.



Expenses for freight train supplies on the Western Region were divided by total freight train miles on the Western Region to obtain a unit cost per freight train mile which was adjusted to December 1958 price levels. The total expenses in this account variable with the study traffic was computed by multiplying the unit costs by the appropriate variable units.

Loss and damage freight: The freight claims, amounting to \$131,610, paid for study traffic during 1958 was obtained by adjusting the total grain claims so as to allow for claims pertaining to domestic grain.

General officers, clerks and other expenses: The general expenses in accounts 451, 452, 453, 454, 455, 458 and 460 were prorated over the total of all other expenses, less traffic and general expenses, to produce a unit cost per dollar expenditure. The multiplication of this unit cost times the expenditures in the appropriate accounts variable with study traffic produced the expense for this item.

Rail communication maintenance and operation: Rail communications maintenance and operations expense, accounts 247 and 407, was related to all other operating expenses in the same manner as above.

Traffic: Traffic expenses were divided in the accounts between freight and passenger. The freight traffic expenses were prorated over all other freight expenses including General and Communications, but excluding pensions, to produce a cost per dollar of expenditure. This was multiplied by the



appropriate expenses to calculate the amount of this expense related to the study traffic.

Pensions: Pension costs included in this study are calculated at 6 per cent of the labour cost attributable to grain. This per cent was calculated by the Canadian National's Accounting and Finance Department.

Joint facilities: Joint facility expenses in accounts 278, 279, 336, 337, 390, 391, 412, 413, 461 and 462 which were incurred by the movement of grain and grain products at statutory and related rates in the amount of \$35,155 were obtained directly from company records as follows:

1. For the movement over the Fraser River Bridge at New Westminster in the Vancouver terminal area, a charge of 53 cents per car and per engine is paid.
2. Movement over the CPR trackage between the waterfront and the Second Narrows Bridge in the Vancouver terminal bears a charge of 50 cents per car.
3. Under exchange switching agreements at the lakehead terminals, the Canadian National pays the Canadian Pacific a rate of \$1.50 for every car of grain and grain products spotted for the Canadian National by the Canadian Pacific at certain designated elevators.

Other railway taxes: Unemployment insurance payments by the Canadian National are included in other



railway taxes, account 468. The cost of unemployment insurance was charged directly on the basis of the labour portion of variable expenses related to the study traffic.

- (d) Analysis of plant, investment therein, and operating expenses thereof, occasioned by movement of the study traffic

The cost included in this category are; maintenance cost variable with the size of the solely related fixed plant, the taxes on this plant, depreciation, and the cost of money.

Maintenance costs variable with the size of solely related plant: In Western Canada there are certain portions of the Canadian National railway fixed plant that are solely related to the movement of grain and grain products. An economic study was made of each branch line subdivision in Western Canada to determine the amount of the solely related fixed plant.

Total revenue from all originating and terminating lcl freight, passenger, express, and carload freight other than Crowsnest traffic was obtained for each branch line subdivision on the Canadian National Western Region. For each subdivision the cost of handling this traffic while not on the subdivision was taken as 50 per cent of the revenues for such traffic. Thus 50 per cent of the revenue is credited to the subdivision alone. This revenue was matched against the cost of handling the traffic other than grain which



included the costs variable with size of plant as well as output. If the cost exceeded the revenue it was considered that the subdivision was solely related to grain and hence the variable cost of the grain traffic should include not only costs variable with grain output but also those costs variable with size.

MR. FRAWLEY: I think that is very important, and frankly I do not understand it. Do you mind elaborating on that? You have given all the solely related costs which are a fairly important item in your final results.

THE WITNESS: Yes, it is fairly important, and I intend to elaborate on it, but I thought I would read down to the bottom of the ---

MR. FRAWLEY: Very well.

THE WITNESS: The results of the economic studies were reviewed to ensure that the remaining plant would constitute an operational unit. In cases where subdivisions served as bridge connections or were otherwise required for operating purposes they were removed from the category of solely related subdivisions. The total miles of roadway and miles of fences on the solely related subdivisions which were not required to keep the railway in an operable condition were multiplied by the size variable unit costs associated with them, as shown by the regression analysis, to produce the maintenance costs variable with plant solely related to the handling of grain and grain



products at statutory and related rates.

This is, as Mr. Frawley suggested, quite an important part of our costing, and what we have done is to study the whole Western Region, subdivision by subdivision, in an attempt to find out which of the subdivisions we could say were the grain lines, or which were related solely to the movement of grain. We have used as our definition -- there have been several tests to see whether a line is solely related, and the first one was to see whether the traffic other than grain would have been enough to sustain the line, or whether you would put a line in, or keep a line that was there, for the traffic other than grain. So, we have taken a look at the traffic other than grain to find out what revenue there was, and this includes our passenger, LCL and all the other revenue, both originating and terminating, and we have looked at the costs of moving it and the costs of the subdivisions, and matched the two. Where the traffic other than grain did not meet these costs -- and in most cases it came very far from meeting the costs -- we said that the costs of this branch line -- that is, the miles of track and the stations along it that have to be maintained -- should be charged to grain as a variable cost with grain. In other words, we have said that this line is constructed and is here to carry grain, and the constant operation, if you wish, or the operation spent in the variable miles of track should be charged to grain.



THE ACTING CHAIRMAN: What yardstick would you have for other traffic?

THE WITNESS: We had to go back to the waybills.

THE ACTING CHAIRMAN: I mean, to get the cost?

THE WITNESS: We used the costs -- in our costing we used the cost -- the same type of costing as we have had in this situation. We knew what was variable, the gross ton miles; we knew how much cost came from originating the car, and the station moves as we have gone over in statement NR 3-1 and 2. In addition to this there is the cost per mile of track, and if we go and refer back to Statement NR 3-1 and 2 -- I think that is Exhibit No. 57-RR -- and if we take the account entitled "Track and road maintenance", which is the second one listed -- this is a revised sheet, actually.

MR. McDONALD: This is actually a new exhibit.

THE WITNESS: We have "Track and road maintenance", and accounts 202 down to 281, and you see we have the variables, and the miles of roadway, and the cost we have associated with that mileage of roadway is \$893.37. Well, this is not on the main line. It is not variable with any traffic. It is there because the traffic is there, and you have to maintain it. What we are saying is that on the subdivisions which are primarily for grain that this cost per mile of roadway should be charged to grain as a variable cost of grain. We did a test



of all the subdivisions, as I have said, on the Western Region. I started off by applying the economic test to get an idea of whether the other traffic was paying, or not, and when we were looking at the other traffic to get the cost of the subdivision, which, I believe, you have asked about, Mr. Chairman, we knew the gross ton miles of this other traffic. We did not know it beforehand. We had to go and make a study, and it took us four months longer to get this data. We had to go through all our waybills, originating and terminating, on the Western Region, and look at them for 1958 only, and that took us approximately four months, as I say. We got the number of carloads, originating and terminating, and the tons and ton miles -- this is for other than grain traffic -- and then we costed this. We knew the gross ton miles; we knew the cost per gross ton mile was 15 cents for maintenance; we knew the locomotive miles, and the miles of fences, etc., and we just put these costs in.

(Page 2376 follows)



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THE ACTING CHAIRMAN: This only covers some of the branch lines?

THE WITNESS: Oh yes. Actually, we looked at most of them; we didn't look at any of the obvious ones, like the main line between Edmonton and Winnipeg. That, for operational purposes, would have to stay. However, in our result in the text the branch lines subdivision -- and this is a bit misleading because we don't classify the subdivision ordinarily as being a branch or main line -- this is it by our definition, and we looked at all of them. We had a list of the ones in the Western region that we found to be solely related. It may be of interest to the Commission to have this.

THE ACTING CHAIRMAN: I think it would be.

THE WITNESS: I think we have it ready to be submitted. This will be Exhibit 57-WW.

---EXHIBIT NO. 57-WW: Document entitled Canadian National Railways, Crow's Nest grain traffic study, solely related lines, showing right of way miles, fence miles and miles of all tracks.

MR. McDONALD: Mr. Chairman, the Secretary suggested that we might just submit the list to the Commission privately, in view of the information it contains.

THE WITNESS: We don't have any concept of the fact these are lines we are considering abandoning; this would be the worst thing that possibly could occur.



THE ACTING CHAIRMAN: You will hand them to the Commission. We don't want a civil war.

THE WITNESS: All we are saying is for costing purposes we think we should put in the constant cost or the cost variable to size as variable with the grain traffic.

COMMISSIONER MANN: What revenue did you attribute to the branch lines?

THE WITNESS: 50 per cent.

COMMISSIONER MANN: You used the Board's method?

THE WITNESS: That is right. Is this going in as an exhibit?

MR. McDONALD: Yes. It is not suggesting that we are going to apply --

THE ACTING CHAIRMAN: It is just for information.

MR. FRAWLEY: Do I understand now that what you call the Acadia Valley branch line is one that is there just to carry grain?

THE WITNESS: What we are saying is grain makes up in most cases -- I don't know the Acadia Valley specifically -- it is over 70 per cent of the traffic on this line now, and the rest of the traffic on the line wouldn't -- we couldn't be justified in considering this line with the rest of the traffic that is there besides grain, and grain is the chief reason for the branch line being there.

COMMISSIONER BALCH: Suppose the grain



disappeared there, would you consider that the line would be gone, too?

THE WITNESS: That is in essence what we are saying. It is a purely hypothetical situation, and what I am saying is that the other one never would have been built if it had not been for grain, and in all probability that would have been a candidate for abandonment if grain were to disappear. If grain were to disappear in the West I think we would have difficulty with the whole line. The point is that this line --

THE ACTING CHAIRMAN: I think we can assume that the line wouldn't have been built if --

THE WITNESS: That is right, and there wasn't any grain, because the rest of the traffic coming in and out of here, passenger and l.c.l. express, it wouldn't justify building the line.

THE ACTING CHAIRMAN: If there wasn't a prospect for traffic they wouldn't have built the line?

THE WITNESS: That is right, and what we are saying here is that on any subdivision when you are costing it, the big problem -- as we have stated before -- is associating the cost with the particular traffic going over it, and on branch line subdivision, or a subdivision as this, we can associate a certain percentage of the costs of the line with the traffic going over it.

Let us say, for an example, that this is about 60 per cent of it, and it is associated with



all the passenger, freight and l.c.l. going over it; the other 40 per cent is your cost whether a branch line or 23.7 miles, or whatever it is, and we are stating that in the cost of grain that we think that these costs should be associated with the grain because these lines are there because of grain and are primarily grain lines.

I was going on to say the other test, besides the straight economic one, was the per cent of the traffic, the work that line was performing for grain, and in all cases the revenue per ton mile on that was over 70 per cent; the revenue ton miles was 70 per cent on grain, and if it was less than 70 per cent we didn't even consider it, so this shows to you how high it is on these lines when associated with grain.

THE ACTING CHAIRMAN: We will adjourn now until 2.00 o'clock.

---Luncheon adjournment.

(Page 2380 follows)



---Upon resuming at 2.00 p.m.

THE ACTING CHAIRMAN: Order, please gentlemen. All right, Mr. McDonald.

MR. McDONALD: Q. Mr. Bandeen, you wish to make a comment on this statement of solely related lines which is Exhibit 57-WW?

A. I wanted to comment that listed down the left-hand side of the page are the subdivisions and we failed to put a heading on the sheet. The heading should be "subdivisions" and all the ones listed here, Acadia Valley, Amiens, Beechy are subdivisions on the Canadian National. There was one other correction --

MR. FRAWLEY: Would you read subdivisions" and "branch lines" as synonymous?

THE WITNESS: No, I would not, I would just have "subdivision". It is wholly related lines. We do not show branch lines as such. I believe in the United States they separate the lines as between branch lines and main lines and I do not think in our own company's case there is any rigid way of segregating these two, but these are subdivisions and some are parts of subdivisions. Where they are parts of subdivisions it is listed like Blaine Lake, that is from Shellbrook to Denholm. I just wanted to be sure there would be no misunderstanding. We sent out previously to the Commission and the American experts a map of the Canadian National showing



all the subdivisions marked on it.

COMMISSIONER PLATT: Before we go on any further on this, in working out the costs did I understand you to say you were using average costs over the whole area. Were these individual costs for the subdivisions concerned?

THE WITNESS: That would be in the nature of an average cost, they were the costs we used for the grain study. We found out the cost per gross ton mile and we just applied that to the gross miles on the subdivision. We did not have the individual cost on the subdivision, we do not have them readily available. To do that we would have to go back and study the maintenance performance of each subdivision and this would involve us in several years study, I should think, before we would finish the whole system. You have to go back to a division level and break it down for each subdivision as to where the extra gangs were spending their time and where the gangs were. That is the type of procedure we go through if you are going to apply for abandonment of a line before the Board. You have to go back and find the exact expenditures and we did not do that in this case.

THE ACTING CHAIRMAN: You apply the system average?

THE WITNESS: Yes.

COMMISSIONER PLATT: It could be true, probably, that on this the cost that you applied



would be actually heavier than what you expended?

THE WITNESS: Well now, I would not think that it would be because what we were applying was the average unit cost and we did not have a test on this. However, I believe that the C.P.R. was able to test this out in their study and if we could leave the cost of this to them.--I do not want to prejudge their study but I believe that they had the exact cost in the cost of some of their subdivisions. We are not applying the system average as such, we are staying in a branch line that this is for maintenance of the branch line. There is a certain cost in each case, I mean \$900 a mile and it does not vary but where the line is it is for keeping the track in minimum condition. The cost if it varies above that depends on the traffic moving over it whether it is freight or passenger and to that extent we take that into account. This was not an average per mile of track, there was an average for the minimum per mile of track and then what was varied on the subdivision.

COMMISSIONER MANN: You used the phrase "minimum cost". Is this synonymous with Class E track standard?

THE WITNESS: I would not want to comment on that. I am familiar with the grades that you mean, the A, B, C, D and E but I do not think it necessarily would be the same as that. Even on the main line there is a certain amount



of expense and road maintenance which is not variable with the amount of traffic going over it. You cannot assign it to that traffic, it is their cost because the track is operating but it is not related to the passenger or freight, it is just a cost as long as you have the line open and it is not assignable. This occurs on our main line and branch lines also and the total cost also varies with the fixed portion that is related to the size of the plant. The total cost varies with the volume of freight and passenger business going over it. In our case what we found was about \$900 per mile of roadway was a fixed cost which did not vary with any of the traffic going over it. It was there because we have the track open. In addition to that it was approximately 15 cents per thousand gross ton miles on freight and there was a similar amount for passenger business going over the track.

THE ACTING CHAIRMAN: Well, applying the tests you had you applied them to yourself?

THE WITNESS: Yes. Granted this is not exact, but if we had -- exact as we could it would take three or four years to get all the costs that occurred. However, we are satisfied that it would on balance be exact enough and since we were only studying the lines that had a grain volume of over 77 per cent of the total traffic, I do not feel we are in any error here at all.

COMMISSIONER PLATT: Would this be a



fair statement: It won't affect the total cost of moving grain?

THE WITNESS: Which?

COMMISSIONER PLATT: Whether these are exact costs or whether they are averages.

THE WITNESS: No, it won't.

COMMISSIONER PLATT: If it is down one place it will be up another.

THE WITNESS: Yes. This was only a method of testing to see which line should be in or which did not go directly into the cost of the grain. What did go in was the fixed cost of miles of track on the lines which were solely related.

COMMISSIONER PLATT: If we did know these exact costs we might find that the cost of moving grain over it was so great you should throw the thing out in the interests of overall operation.

THE WITNESS: Yes. I am sorry but I have been reminded that this figure of \$900 that I have been using is a bare bones figure and it does not include any depreciation or overhead charges. I believe that it is around \$1,300 per mile of track and this would have to be minimum maintenance although I would have to check the figure carefully. It can be ascertained from our studies but I believe it is slightly over \$1,300 as a minimum maintenance cost which is there just because the track is open. We have found that it applies across the system. Actually



all the difference between a mile of track and a mile of branch line is the density of traffic going over it and this could make a terrific difference.

COMMISSIONER PLATT: Do you have in your study the ton miles that would go over these lines?

THE WITNESS: Yes.

COMMISSIONER PLATT: So if one wanted to one could do some sort of study on what the costs were in moving grain?

THE WITNESS: I do not think I quite understand. The relative costs between a branch line and a main line?

THE ACTING CHAIRMAN: The individual lines.

THE WITNESS: Yes, we can go back to the individual lines and study the cost of moving grain across the individual lines. We have not done that for each of the individual lines.

COMMISSIONER PLATT: I quite appreciate that.

THE WITNESS: We had to build up the basic data as I described on Friday and this morning on the basis of subdivision and we have all the grain data that would be sufficient to build up the cost. However, it would be quite an involved -- well, it would be lengthy, it is not involved but it would take up a good long while if we had to perform a cost study for each subdivision in the West and there are about 129 that either have grain originating or passing



over them.

COMMISSIONER PLATT: If you decided the total bill for moving grain was too great and you had to go and see where you would cut down then this sort of analysis would be useful?

THE WITNESS: Well, it would be done and it would be done -- now, it applies whether we are doing a grain study or not. I believe our President, Mr. Gordon, stated we were looking at the different subdivisions across the country in a progressive fashion and it would take us several years to analyze them all. We have before the Board now some five abandonment cases and these are cases where we feel it would be more efficient if we were out of there.

THE ACTING CHAIRMAN: But you could not, without very considerable work, answer with respect to each individual --?

THE WITNESS: No, we could not. It would involve a great deal of work.

THE ACTING CHAIRMAN: Very well, Mr. McDonald.

MR. McDONALD: Q. Now, Mr. Bandeem, that finishes your comments there?

A. I would like to make one correction which will be of aid to Mr. Frawley's American experts. I think on Exhibit 57-RR which is our Exhibit NR 1 and 2 we have on page 1 of this, on the second group of accounts entitled "track and road maintenance", the last account listed is



280 and it should be 281. This is just a typographical error but it is the type of thing that could be quite significant.

THE ACTING CHAIRMAN: Just repeat that.

THE WITNESS: On page 1 of Exhibit 57-RR which is Railway NR 3-1 and 2, the second group of accounts there is "track and road maintenance" and the last account listed under it is Account 280 and it should be 281. This is a typing error and it should be listed as 281. I am now at page 35 of the text at the bottom of the page. Municipal and other taxes which are paid on the solely related plant were obtained from company records and included as a cost variable with the study traffic.

Depreciation

Road Property

Depreciation on road property, account 266, is compiled on a system basis as the investment in plant in the various property accounts is recorded on a system basis only for the Canadian National. Depreciation associated with each property account was divided by the expenses for the related maintenance of way accounts to produce a unit cost per dollar of related maintenance of way expenditure. This was multiplied by the appropriate maintenance of way expenses variable with the study traffic to produce the road property depreciation variable with grain traffic.



Rolling Stock

The weighted average original cost per grain car (Statement NR 1-32) was multiplied by the number of cars required to handle the study traffic to obtain the total original cost of the grain fleet. The annual depreciation on this fleet was computed by applying the rate of depreciation approved by the Board of Transport Commissioners for this type of equipment.

Now we move to Statement NR 3-7 which is revised and the revised edition will be Exhibit 57-XX.

---EXHIBIT NO. 57-XX: Statement NR 3-7 revised.

I think that I might just read all of the text on depreciation of rolling stock and then refer to the exhibit.

The total yard locomotive miles accrued by grain traffic was divided by the average miles per yard locomotive on the Western Region during 1958 to compute the number of yard locomotives required. This number was multiplied by the average original cost of yard locomotives on the Canadian National to produce the total original investment required in yard locomotives for the study traffic.

The total freight diesel unit miles accrued by the study traffic was divided by the Western Region average miles per freight diesel unit for the year 1958 to produce the total number of diesel freight units required. This number was



multiplied by the average original cost per freight diesel unit to obtain the total original investment required in freight diesel units for study traffic.

The sum of yard and freight diesel investment is the total investment required in diesel power for the movement of grain and grain products at statutory and related rates. The rate of depreciation approved by the Board of Transport Commissioners was multiplied by this total investment to produce the depreciation cost variable with study traffic.

The total depreciation in work equipment was divided by the total expenses in the road maintenance accounts to give the unit cost of depreciation per dollar expenditure in the accounts. This was multiplied by the appropriate expenses to produce the depreciation cost variable with the study traffic.

Now, if we can go to the exhibit which I put in, the revised NR 3-7 which is Exhibit 57-XX. I would like to explain the statement as well as the changes. For boxcars, there were no changes and the number of cars, 9,976 has an allowance for O.C.S. movement in it which explains the difference between the 9,718 which we had in a previous exhibit. It is an allowance for cars to carry O.C.S. The average cost of these cars is \$4,448 and the gross investment was \$44,372,192 and the annual depreciation rate is 2.85 per cent.



Now, when we were talking with the American lines about depreciation they suggested that we should try and find out if these different types of equipment had a different depreciation rate or whether this was a composite depreciation rate, and for box cars we found that 2.85 was the depreciation rate used for all freight equipment, and in our method of calculating depreciation, and the rate accepted by the Board of Transport Commissioners, we didn't make a differentiation of the different types, whether it is a hopper or a gondola or a box car; but from the company records the box car has a shorter average life expectancy than our hopper car or gondola, so to use the 2.85 would be using a figure which was lower than if it was specifically for box cars.

When we move to locomotive road we reduce the number of units from 93 to 91, and this reflects the number of unit miles affected when the unit miles were recomputed, as I dealt with this morning when we used the diesel unit miles. So this reduced the number to 91, the average cost remained the same, gross investment was decreased. The annual depreciation rate was taken at 5 per cent, because in studying the depreciation rates as suggested by the Americans, we found there was a separate depreciation rate for road and one for yard, and it was 5 per cent for road and 4 per cent for yard. This had the effect of bringing up the annual depreciation cost for road locomotives and reducing the yard one. Those are the only



significant changes ---

THE ACTING CHAIRMAN: Wasn't the effect to increase the total by about 30,000?

THE WITNESS: Yes, it did, by changing the rate of depreciation for road and yard.

Page 37 of the precis:

Shop and power plant machinery: The total depreciation in shop and power plant machinery was divided by the total expenses in the maintenance accounts to produce a unit cost of depreciation per dollar of expenditure in these accounts, which was multiplied by the appropriate expenses to give the cost variable with the study traffic.

Cost of money: Since road property investment is obtainable on the Canadian National only on a system basis ---

MR. FRAWLEY: Mr. Chairman, I have an objection to make to this evidence, but I think it best to let it be read.

THE ACTING CHAIRMAN: Subject to your objection.

THE WITNESS: Since road property investment is obtainable on the Canadian National only on a system basis, cross sectional regression methods could not be used to obtain the relation between road property investment and the size and traffic output variables. However, the Canadian Pacific Railway, whose property investment accounts are maintained on a division basis, was able to perform this analysis. Since the Canadian National and



Canadian Pacific were built during the same time period and in similar areas and since the Canadian National has a larger road property investment per mile of track than the Canadian Pacific, the Canadian Pacific's analysis of investment variable with traffic and size was used by the Canadian National. The net road property investment variable with study traffic was computed using the Canadian Pacific net investment unit costs for mile of track, gross ton miles, and yard and train switching miles. Gross ton miles and switching miles for the study were obtained from the basic data and the terminal switching studies. Miles of track were obtained from company records for those subdivisions, and for yard trackage, that were solely related to study traffic. Miles of yard trackage solely related to grain and grain products traffic moving under statutory and related rates were obtained from the office of the System Supervisor of Terminal Operations, the office in charge of yard design on the System. Now, this is shown in NR 3-8, which is again revised, a revised copy.

MR. McDONALD: This will be 57-YY.

---EXHIBIT NO. 57-YY: Statement NR 3-8.

THE WITNESS: The changes in this table and the table itself -- I think I should explain that under freight the gross investment was the same figure that appeared on NR 3-7, which is Exhibit 57-XX. The depreciation that is taken off is not the annual depreciation; it is the accrued depreciation,



and the net investment is the net investment figure as it appears in the accounts of Canadian National. With diesel locomotives the same thing applies, and the depreciation is the total depreciation carried on the books, and the net investment is the net investment of Canadian National.

On the left, headed "Gross unit investment," these figures came from the investment study of the investment variable with their traffic, and I think it best to leave it to them to speak on as to how they adduced these; but it shows, translated into Canadian National's experience, that approximately \$4.36 per thousand gross ton miles was variable, and this comes to \$45,732,748. The C P.R. similarly found in their experience it was \$12.66 investment in switching miles, and the miles of track is \$15,130.39 per mile of track. So we have just taken their unit variable investment.

I want to interject here that this is a very conservative method of doing it, because our investment is much higher than Canadian Pacific's. I don't want to guess or estimate why it should be, but it is partially, and I should think almost completely, as a result of the history of Canadian National and the way it was put together and, at the time of amalgamation, the manner of investment. However, if we went back to try and determine what our total investment was, it would understate it. If we were to do a similar analysis on our own lines we would have different figures, and this again stems



from the history of Canadian National Railways and the way the figures were kept and not kept at the time of amalgamation.

I noticed that Professor Currie was here in the audience and he was advising the Board, and he would be able to tell you better about the history than I can.

THE ACTING CHAIRMAN: You took their costs?

THE WITNESS: We took their unit costs, yes.

The gross ton miles are related to grain, the switching miles are Canadian National miles related to grain, and the miles of track are the miles of track that you will find in that exhibit that we put out with the branch lines ---

THE ACTING CHAIRMAN: But you adopted the C.P.R. dollar figures?

THE WITNESS: Yes, our own output figures. So this gave us a gross investment of \$106,208,000, and we took off the depreciation as shown in our books. Actually in this case we took the C.P.R.'s depreciation figure because we were using their dollar figures, and I think it was approximately 37 per cent, and we applied the same thing, although we felt our figure was not that high; so we have a net investment of \$68 million plus. The work equipment and shop and power plant machinery are unchanged or relatively unchanged from the previous exhibit.

MR. FRAWLEY: Mr. Bandeem, would you explain what method of depreciation was used? Was it straight line or ---



THE WITNESS: It is straight line. These are the Board's methods of depreciation, because we have them throughout. I am not as familiar as you probably are, Mr. Frawley, with the depreciation methods, but, as I understand it, we use straight line on Canadian National now, on both railways. That gives us the grand total of \$122 million plus dollars, and a change from the \$124 million which we had before. The majority of this change comes in the fact that we had just used the wrong figures for miles of track and we found out it was an error of our own internally; it should have been 3,400 and approximately 40. That was an error in transcription within our own department, and we have corrected for it.

The next page is page 38, and the table at the bottom of page 38 is going to be changed because of these changes we have mentioned previously, so I think it better if we just change the ---

MR. MAURO: There is also a change on the switching miles on that same exhibit.

THE WITNESS: Yes. We had just mis-added the columns and got a wrong figure. It wasn't much of a change, and we had just added the figures together and got a wrong total. We tried to eliminate this, and we are quite sure, because we have checked it several times now. But when it was put in the error was there. We have a new page 38, and I think we may as well put the whole page in because the table at the bottom changes -- although not too much.

(Page 2404 follows)



To the best of my knowledge the text is the same -- at least, it is supposed to be --and the only change is in the table.

The net investment in freight cars, diesel locomotives, work equipment and shop and power plant machinery related to the study traffic was obtained by multiplying the investment in such equipment by the ratio of net investment in each property account to related gross investment.

The cost of money invested was taken to be 6.5 per cent. This cost is the alternative cost of money or the return which should be earned if invested in a similar enterprise. After allowance for the payment of income taxes on other than the fixed charges, return on the investment before income tax must be 10.96 per cent. This per cent was used to calculate the annual cost of the net investment for road property, freight cars, diesel locomotives, work equipment and shop machinery variable with study traffic.

MR. FRAWLEY: That 6-1/2 per cent was just taken from the Canadian Pacific, was it not?

THE WITNESS: In our case, no -- I believe it was. We are on the same basis as the Canadian Pacific in that we both use 6-1/2 per cent. However, we have a witness coming up on this, and I think we have a precis of evidence submitted which shows that if we had adhered strictly to our own experience it would be slightly over 6-1/2 per cent, but I think both cases took 6-1/2 per cent.



In both cases I think they would both be slightly over.

MR. FRAWLEY: Yes. I will make my objection at this point. I will not develop it, but I would like to develop it when the witness who will bring that material goes into the witness box. The objection, briefly, is --

MR. SINCLAIR: You stated it before.

MR. FRAWLEY: No. If my friend will bear with me, in my submission it is appropriate to put the objection on the record, and each time I see 6.5 per cent I propose, if the Commission allows me, to put an objection on the record.

I state it because my position is that the law in Canada -- and I use that word, I think, appropriately -- the law in Canada as laid down by the Board of Transport Commissioners up to now is that there must be no determination of a rate of return on the basis of so much being the cost of money and so much being the amount of millions of dollars invested in property account.

That is, essentially, in my submission, what the railways are doing here. The Board as of today has made a finding which gives the railways a rate of return of $3\frac{1}{2}$ per cent.

MR. SINCLAIR: That is wrong.

MR. FRAWLEY: That is a -- I wish my friend would permit me to pursue what I have to say, and then he can take as much time as the Commission sees fit to give him --



MR. SINCLAIR: Why does not my friend be accurate.

MR. FRAWLEY: I say now that the Board, by virtue of the last judgment -- in the last judgment the Board said the Canadian Pacific Railway, the yardstick company, was entitled to earn an amount of \$51,203,000, and using the most recent figure that we have of \$1,400,000 as the amount in the property investment account Mr. Morrison tells me that works out to roughly 3-1/2 per cent. If that is what my friend is complaining about then I will take it up with Mr. Morrison. However, that is what I state is the law of Canada today.

Now, I want to be very quick to say that this Commission is not bound by what the Board of Transport Commissioners has done, and this Commission could say 3-1/2 per cent is not a fair cost of money. They can say 6-1/2 per cent, 7-1/2 per cent or 8-1/2 per cent. This Commission is quite free to listen to the evidence and come to its own conclusions, but I do want to say, and I do submit very respectfully, that if you were thinking of departing from what has been laid down by the Board of Transport Commissioners then I think we should have ample notice so that we can have another case of the kind we had in 1954, and we could bring witnesses to controvert the position taken by the railways.

We do not propose, I would say right now,



to do that at the moment because we are confident that the Commission will adhere to what the Board of Transport Commissioners has laid down, but I just say in passing that if the Commission was thinking of opening up the whole matter of the propriety of the 3-1/2 per cent, or whatever that amounts to to the decimal point, then I would simply ask the Commission to give us ample notice of that, and we will go abroad, as we did in 1954, and endeavour to bring witnesses here to take care of that, as the Chairman said a few days ago, a trial within a trial which then would arise in the Commission's proceedings.

I will say no more than that, but I would like to elaborate on it. I have some instructions from Mr. Morrison which are not at hand at the moment.

MR. SINCLAIR: So that our position on the objection is not forgotten, and so that my friends will understand our position and so that the Commission will understand our position, I will say that I disagree with Mr. Frawley. I disagree with his interpretation of the law. The cost of money is a fact, and we are prepared to determine that fact.

The Board of Transport Commissioners were dealing with an overall permissive level of net real income. We are not dealing with that in the proceedings or in determining what the cost of capital is. Indeed, so that he will not



be misled, we believe, and our instructions are, and the advice we have received from our consultants is, that the cost of money is a very real cost, and we have determined it. We are not reversing the Board of Transport Commissioners. We are not trying to ask this Commission to determine what should be the overall permissive net real income for Canadian Pacific at all, but we are asking them to accept the fact that this has developed into the question: What is the cost of money? If my friend wants notice of that he has had notice of it for some substantial time -- indeed since the 15th day of October last, and for over a month it has been set out in some detail in the precis. I would certainly wish to say to the Commission that if he needs to go abroad, as he puts it, to deal with this issue he had better start going, and quickly. I am surprised that he has not gone before now because he has certainly had plenty of time.

THE ACTING CHAIRMAN: I understood that we were not dealing with any fixing of a permissive level of rates. That is not your intention at all?

THE WITNESS: No. As far as I am concerned this was an economic cost that we are dealing with. I would shy away from anything to do with rates. I am not familiar with them. This is a concept of cost, or money which you have tied up in an investment. Although you may



own it outright it still costs you money. Even if you own your own home --

MR. McDONALD: Q. Well, Mr. Bandeem, there is another witness.

A. Yes, there is another witness.

Variable cost of transporting grain and grain products moving at statutory and relates rates -- before considering this I think we should look at the summary table at the bottom of page 38. This is a summary of variable cost of moving grain and grain products at statutory and related rates, and this includes in it all of the changes we have made so far on the suggestion of the American experts and on our own behalf. I want you to note that the only figures that have changed in this table at all are "communications, rail" which changes from \$500,000 to \$400,000, and "joint facilities, taxes, and cost of money" which goes down from \$14 million to \$13.8 million. This gives us a total decrease in the total variable cost of \$300,000, or from \$46 million to \$45.7 million.

Now, "communications, rail" was reduced due to the fact that commercial communications depreciation was erroneously included in the original figure, and "miscellaneous, rents, taxes and cost of money" was reduced from \$14 million to \$13.8 million due to the change in the net investment as noted in Statement NR 3-8.

If we can go to Statement NR 3-9, which



is a fixed page exhibit, which you will see in-
corporates all of the changes which we have listed.

MR. McDONALD: That will be Exhibit
57-ZZ.

---EXHIBIT NO. 57-ZZ: Statement NR 3-9 revised.

THE WITNESS: Exhibit 57-ZZ is an exhibit
which summarizes all of our variable costs of moving
the study traffic, and the set-up is this that we
have listed down the left-hand side the expense
accounts with which we are dealing, and then under
"units variable with study traffic" we have listed
the units, whatever they may be, which are variable
with study traffic. Under "track and road main-
tenance" we have "miles of roadway", and, again,
we have our figure of 2,955.3 miles, and then we
have "gross ton miles freight trains" and the
figure 10,491,665. These are all units which
are associated with grain.

Now, in the first one we had "super-
intendence and miscellaneous" and this is the
direct road expense, and the road maintenance
expenses which are associated with grain, and
you find that by -- I believe the middle column
headed "variable costs less depreciation" in
the other accounts, the \$5 million, would be
some of that.

We find that for each dollar in those
expenditures there was 11-1/2 cents spent on
supervision, and the final cost is in the --



well, I should go across to the "unit variable cost" column, and we get from both regression and from this direct costing -- in the first case it is 11 cents for each dollar of expenditure on road maintenance and then we come down to 15 cents per gross ton mile freight trains, 78 cents per yard locomotive mile, and so on. I believe that is \$41.167 for the miles of fences. That is not a comma there, although it looks like a comma in my copy.

The next column is the variable costs without the depreciation in, and that is just gotten by multiplying the first two columns together. Then, we have the depreciation ratio, as I explained in the text, for the road maintenance account, and we add the percentage of depreciation to the expenses.

As an example, again, if we take "fences, snow sheds and signs, 221" we find the depreciation in 1958 was 40.73 per cent of the actual expense in the account, so, accordingly, we increase the expenses that we allocated to grain -- I should not say "allocated"; I mean the expenses we found to be associated with grain through regression analysis -- by the 40 per cent to get the depreciation associated with grain. Actually, I found out I was incorrect in saying there was only for 1958. We took the depreciation as an average for the three years, 1956, 1957 and 1958.



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Bandeem, Dir.
(McDonald)

2412

After the depreciation ratio we get the actual depreciation, and that is in the second column from the end of the table. That shows the actual amount of depreciation which we charged to grain in costing the study, and then the last column is headed "total variable costs" which you can total, and we will find in that summary sheet on page 38 the final figure.

(Page 2416 follows)



Now, the changes which occurred on these pages, again to be of an aid to the Americans, are ones all of which we have explained except total diesel locomotive miles, which comes under water and fuel stations account 231, and that by error in the first case we had shown the unit miles rather than the locomotive miles and we changed it, and this reduced it -- the unit miles being some 8,626,000 and the correct figure was the locomotive miles of 5,383,268.

Now, the second page, the set-up is the same as on all pages, the column headings and the method, so I will just note the changes which we made on the pages.

On page 2 we had changed the road unit miles, which comes under diesel locomotives - 311A, and that was again for the reason that we have given in the text, that we decreased the road unit miles on the suggestion of the American experts; that we should be looking at the ratio of diesel locomotives to train miles, rather than to both diesel and steam, and the yard unit miles changed for the reason we have given, and then there is the change from cars terminating at Victoria rather than Vancouver. The change in that was very slight.

Page 3, the chief change here was a change in total carloads, which is shown under train control, accounts 249, 372 and 404, and also under station employees and expenses, accounts 373 and 376, and the total number of carloads is increased from 132,246 to 141,134, and that was due to the fact that some 8,888 carloads reloaded at mills in



transit after milling were erroneously left out. In other words, we had not counted as many cars as we should have for this purpose and this fact again was pointed out in our conversations with Mr. Wood, an adviser to Mr. MacKimmie, I believe, and we have increased them to the proper place here.

On page 4 the figure for gallons of diesel fuel -- this comes under the heading of train locomotive fuel and power, account 394 -- we decreased this because again we had put in an OCS charge twice; we put it in when we were doing the original computation, and then we increased the total for OCS, so it gave you the factor of double accounting, so we have taken it out.

Now, on page 5 the chief change is Communications -- rail, and as I explained when discussing the summary total on page 38, we had included by error the depreciation for commercial communications as well as for rail communications, so we took it out and the depreciation charge went down from \$127,440 to \$54,681, and the property tax, the item changed from \$166,483 to \$262,883, and this followed final receipt of our figures from the Western Region, and we asked them for the actual property taxes, and at the time we sent this out the actual figures we had were \$166,483. and since then they have been able to go over each one of the solely related lines and found the actual property tax paid in 1958 and it increased it by approximately \$100,000.



Now, the final page is a change for their cost in money, which I have explained previously; it is taken under the total -- you will notice under the unit variables with steady traffic we have \$122 million, and that was decreased, as I referred to previously, from \$124 million down to \$122 million, so that changes your total cost variable of traffic from \$13,648,554 to \$13,420,231, and the total cost ---

MR. McDONALD: Q. \$13,420,231?

A. That is right, and the total variable cost went down from \$45,985,194 to \$45,680,999.

If there are no other comments I will go back to page 39 of the text.

Total cost of transporting grain and grain products moving at statutory and related rates

The variable cost of moving the study traffic is not the total cost to the railway. There is, in addition to the variable costs, a constant cost which cannot be directly assigned to any specific segment of traffic. Total railway costs must, however, be recovered from total revenue and each segment must bear a portion of the constant cost.

Determination of the study traffic portion of the constant costs involves two steps:

- (1) Derivation of the total constant cost
- (2) Proration of this expense to obtain the portion related to grain.

Derivation of the total constant cost:

The total constant cost is the difference between total rail costs and the costs variable with freight and



passenger traffic. Total rail costs for 1958 were obtained from company expense accounts plus the annual cost of the net investment. Total variable costs were determined using the unit variable costs obtained by the analysis outlined in sections (c) and (d). No solely related plant costs were included in variable freight or passenger costs. Some expense accounts which were not variable with the study traffic were included in total variable costs since they vary with the other traffic. The basic traffic output statistics required for the computation of the total variable costs were obtained from company records. Statement NR 3-10 shows variable costs of freight traffic and the total constant cost for the Canadian National for 1958.

MR. FRAWLEY: What do you mean when you say, "plus the annual cost of the net investment"?

THE WITNESS: It is the cost of the net money invested in the Canadian National Railways; it would be our $6\frac{1}{2}$ per cent times the net investment.

MR. McDONALD: Q. It is a new statement?

A. NR 3-10 revised.

MR. McDONALD: This will be exhibit 57-AAA

---EXHIBIT NO. 57-AAA: NR 3-10 revised.

MR. FRAWLEY: I think before the witness proceeds I should just make this observation; that sentence with respect to which I asked Mr. Bandeem a question, reads as follows, "Total rail costs for 1958 were obtained from company expense accounts



plus the annual cost of the net investment." To me that is certainly an attempt to fix the rate of return on a rate basis. It just can't mean anything else.

MR. McDONALD: I don't think we need this argument all the way through; no doubt we will hear of it.

THE ACTING CHAIRMAN: I think Mr. Frawley has made it sufficiently clear.

MR. McDONALD: Yes.

THE WITNESS: Before I describe this next exhibit, I want to make sure that something that wasn't altogether clear in the text is cleared up. The total constant cost for Canadian National shown in this exhibit doesn't contain the costed portion of passenger traffic expenses that are entirely related to passenger traffic, nor any other costed portion that could be identified with passenger traffic.

MR. FRAWLEY: Which proposes to explain how you eliminated them.

MR. SINCLAIR: I thought my friend didn't want to cross-examine.

MR. FRAWLEY: I have been waiting for that since ten o'clock.

MR. SINCLAIR: And now you have got it. I am glad to see you have changed your mind.

MR. FRAWLEY: I haven't changed my mind and I am not cross-examining. If I am not to be allowed to ask a single question for clarification as the matter goes on, I might as well close my



books up and go back to my office.

THE ACTING CHAIRMAN: I think the witness will be glad to explain, and has been all day, and Mr. McDonald has been glad to help him.

MR. FRAWLEY: I will observe that the objection didn't come from counsel for the Canadian National Railways.

MR. SINCLAIR: Perhaps we will see lots of objections with the next witness; Mr. Frawley can cross-examine him in full.

THE WITNESS: What was your question? How we got the passenger portion out?

MR. FRAWLEY: Yes. I am sorry, but I was still thinking about my friend Mr. Sinclair; I am ashamed of myself. I really apologize for that.

I just wondered if you will explain this; you said the passenger costs were not in there and I wondered if you would explain how you got them out.

THE ACTING CHAIRMAN: Anyone reading the record wouldn't understand that you and Mr. Sinclair are the best of friends in the world.

MR. FRAWLEY: No, they wouldn't understand that; they would have to follow us around.

THE WITNESS: I think if I could explain the exhibit first and then afterwards, perhaps, if there are any additional comments -- it is a rather embarrassing exhibit; the revisions are extensive and we have nobody but ourselves to blame for those, and I remember early in the day I think it was the Chairman of the Commission who said he was amazed



there were not more errors than have occurred in just straight adding. Well, on this particular exhibit I am afraid I have to take full blame for the first one that went out and the obvious errors that are in it, and in an attempt to get this out to these people so they could have it in advance of the hearing, we were working under a considerable amount of pressure and one of the key gentlemen who was making this up became ill two days before we sent it out, and I personally completed it, and this shows the fallacy of anyone in charge of something trying to do it without the person who has full knowledge of it being there, so revised NR 3-10 shows the correct figures.

Now, under road maintenance the errors were occasioned primarily because I added the depreciation in twice as the variable cost. So, this put up the portion of variable and took down the portion of constant, correspondingly.

Under equipment maintenance I added a sub-total as well as all the other totals, and so practically doubled it. The correct figures are shown in the new exhibit. In all cases depreciation has been put in twice, and this has been rectified. The new figures show the cost variable with freight traffic and the constant costs, and the constant costs which should be directly assignable to passenger business are not shown here on the page at all, and it is not a case of taking them out, they just never were put in in the first place.



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I would like to comment on some of the figures on the table. There was some question by the Americans when they came up about our method of putting depreciation in for the road maintenance and the fact we did not have figures by division but only a system figure. We had to go back and put it in on the basis of the other expenditures in the road maintenance accounts. The only check we have on the validity of this is that over -- a method used in the States of measuring the costs in railroading is to give the percentage variability. This is a per cent that varies with the traffic either passenger or freight and in the case of Canadian National for road maintenance our percentage variability was 39.25 per cent. Now, I am not all that familiar with the American costing and we do have another witness who will be appearing later in the week who is familiar with American costing, but my understanding is that the American experience is that in road maintenance the percentage variability varies, I think about 40 some per cent up to about 70 per cent so we were beneath the American experience in this. However, we are in the same area as the Canadian Pacific and they undoubtedly will be putting in their own figure but they are in the same neighbourhood as we are. They had depreciation figures on the division basis and we had to pro-rate back and come up with relatively the same variability in road maintenance so we



could not have been too much in error if at all.

THE ACTING CHAIRMAN: I think we will have
a short recess now.

---Recess.

THE ACTING CHAIRMAN: All right, gentlemen.
Yes, Mr. McDonald?

MR. McDONALD: Q. All right, Mr. Bandeem,
will you continue?

A. I do not think I have any other
comment on this table showing our total costs for
the system. I just wanted to stress that even
with depreciation included as we did we get a
very low per cent.

THE ACTING CHAIRMAN: Mr. Bandeem, you
do not have to apologize for your mistakes. We
have been very impressed with your frankness,
honesty and diligence and we appreciate the fact
you have been frank with your information.

THE WITNESS: Thank you very much,
sir. It is rather embarrassing with changes of
this magnitude. I return now to page 39 near
the bottom of the page.

The study traffic's share of constant
cost.

The portion of constant costs is computed
by multiplying the total constant costs by the
ratio of study traffic variable costs to total
freight traffic variable cost. This is statement



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Bandeem, Dir. 2430
(McDonald)

NR 3-11 which is revised and will now be Exhibit
57-BBB.

---EXHIBIT NO. 57-BBB: Statement NR 3-11.

This is revised because we changed the constant cost as I have just described. If I might just go over this with you: This our method of getting constant cost applicable or to be associated with the grain and what we did was take the cost of variable with total freight traffic which is \$421 million and the variable cost of study traffic which is \$45,700,000 and of these the solely related size variable costs is \$9 million, these are the costs related to solely related lines we discussed earlier today. We took these away and it gives us a costs variable with study traffic of \$36,700,000. Then, we expressed this \$36,700,000 as a per cent of the total, costs variable with study traffic and costs variable with total freight traffic and this comes to 8.72 per cent. The study traffic's share of total constant cost is the constant cost for the system \$311,700,000 times the 8.72 per cent or \$27,200,000. This last solely related size variable costs of \$9 million which we have already associated with traffic and this gives us study traffic's net share of constant costs \$18,200,000. I would like to point out that the size of the variable cost that we found related to these solely related branch lines so this will



not in any way affect the total costs. All it will do is change the distribution between variable cost and total cost.

MR. McDONALD: Q. Between variable and constant?

A. Yes. In other words, if we were to have \$1 million less solely related cost to size variable it would have reduced the cost of variable of the study traffic by \$1 million, but it would have increased the cost by exactly the same amount and we would have ended up with the same total cost of grain. This has proven to be a little confusing so we spelled it out so it would be more meaningful.

The total cost of transporting grain and grain products moving at statutory and related rates was obtained by adding the share of constant cost to the total variable costs of moving the study traffic.

Now we come to page 40 and since a considerable number of figures on page 40 have changed we have prepared a new page 40 which we can put in.

Summary of revenue and costs

Revenue	\$28,700,000
Variable cost	\$45,700,000
Portion of constant cost	\$18,200,000
Total cost	\$63,900,000



Average revenue per ton mile	0.48¢
Average variable cost per ton mile	0.77¢
Average total cost per ton mile	1.07¢

The summary of the cost in the table on page 38 and immediately above show the results of amending the costs set out on page 2 of the Canadian National submission dated October 15, 1959. In addition to the tables on page 2 of the Canadian National submission dated October 15, 1959, the following figures must be changed;

paragraph 4, page 2

line 6	-	\$ 14,900,000	should read	\$18,200,000
line 9	-	\$ 43,900,000	should read	\$45,700,000
line 10	-	\$ 14,900,000	should read	\$18,200,000
line 10	-	\$ 58,800,000	should read	\$63,900,000

paragraph 7, page 3

line 6	-	\$ 58.8	should read	\$63.9
line 7	-	\$ 28.6	should read	\$28.7

I would like to add that all along on the first two parts of the study you inquired as to the number of people occupied. On this last portion we had a staff of four people since January 1st of this year full time and overtime, I am afraid, a great many times. We have utilized our electronic equipment in Montreal to compute the regression work. I do not even have an estimate of the hours on that. We have been able to fill in at night and so on. In addition we have had temporary people, people in the regions



who have looked up the data for us and summarized it and we have been able to rent -- I think that is the right word -- a lot of time from some of the calculating services in Montreal. Our total time on this last operation is at least four people who were full time and all this additional work which it is hard to check on.

MR. McDONALD: That completes your evidence?

THE WITNESS: Yes, it does.

THE ACTING CHAIRMAN: Thank you very much, Mr. Bandeem. I understand cross-examination is reserved including that of Mr. Cooper.

MR. SINCLAIR: Our next witness is Mr. Stenason.



STENASON, Walter John, Called.

DIRECT EXAMINATION BY MR. SINCLAIR:

Q. Mr. Stenason, I believe you were born in Winnipeg about 1930?

A. Yes, that is correct.

Q. And you received your primary education in Winnipeg and then moved with your family to the Pacific coast where you took your secondary school education at the Oak Bay High School?

A. That is right.

Q. And after that you went to McGill where in 1952 you graduated with the degree of Bachelor of Commerce with first class honours in economics. You were the recipient of the Lieutenant Governor of Quebec medal in commerce and the Sir Edward Beatty medal in economics. In 1954 you received your Master of Commerce degree at McGill. From 1954 to 1956 you did post-graduate studies at Graduate Faculty, Harvard University. You have completed all requirements with the exception of final acceptance of your thesis for a Ph.D. degree from Harvard.

A. Yes, sir.

Q. Your thesis is entitled "Competition in transportation; an analysis of market structure and price policy". While you were at Harvard you participated in study sponsored by Canadian Pacific and carried out by members of the Harvard faculty into the long-term prospects of the



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Stenason, Dir. 2435
(McDonald)

Canadian economy, its major regions, and its major industries, as well as the market and cost characteristics of the principal forms of transportation.

As to your services with Canadian Pacific, you joined in 1952 after graduation from McGill and you joined the research department. For two years you were engaged in general research concerning transportation operations, traffic and costing matters. After completion of post-graduate studies in 1956 you returned to the Canadian Pacific and in January, 1958 were promoted to the position you now hold which is Director of Economic Research for Canadian Pacific.

Your responsibilities in this regard are, first, short-term forecasting of the general economy; economic aspects of certain railway operating problems; some aspects of capital budgeting; cost analysis; studies in general transportation economics to assist in planning by Canadian Pacific for integration.

You have appeared as a witness before the Air Transport Board and also before the Labour Boards, conciliation and arbitration as they are known.

You are a joint author of a book entitled "Avoidable Cost of Passenger Train Service" published by the Aeronautical Research Foundation of Cambridge. You are also joint author of a book entitled "The Economics of Competition in



the Transportation Industry" which was published by Harvard press in the Harvard economic studies series this year.

You are a member of the Canadian Economic and Political Science Association: member of the American Statistical Association; member of the American Economic Association; member of the American Finance Association; special lecturer at the Transportation Institute of Northwestern University, Evanston, Ill.

A. That is right.

Q. And to identify you further with the Canadian Pacific, your father for many years was an official in the mechanical division of the company's service?

A. Yes, that is right.

Q. Now, Mr. Stenason and members of the Commission, I think it would serve best if I take the various attachments to the precis of Mr. Stenason's evidence which has been filed with the Commission and in the hands of my friends for some considerable weeks and ask that they be entered as an exhibit and marked.

THE ACTING CHAIRMAN: Is this a memorandum in respect to the results of cost study?

MR. SINCLAIR: Yes. The first of these is a document entitled "C.P. Railway" consisting of two sheets "Yard foreman's Work Report card form T-1" and "Yard foreman work report card form T-1" being the instructions on the back. That



would be Exhibit No. 58.

MR. COOPER: Exhibit 58 and 58-A.

MR. SINCLAIR: These are not a group and it would be easier in handling them -- there are only 12 of them -- to mark them seriatim because they are not of the same type.

MR. COOPER: Well, if they are not of the same type perhaps it would be easier to mark them seriatim.

THE ACTING CHAIRMAN: Yes, I think so.

MR. SINCLAIR: I am not filing the memorandum as an exhibit.

---EXHIBIT NO. 58: Two sheets re foreman's work report card.

MR. SINCLAIR: As Exhibit 59 a document entitled Canadian Pacific Railway statement in respect of yard engine hours in Western Canada in 1958. This is designated in the lower right-hand corner as Statement 401.

---EXHIBIT NO. 59: Document entitled C.P. Railway's statement in respect of yard engine hours in Western Canada.

MR. SINCLAIR: This one is designated in the lower right-hand corner as 402 and I would ask to have it marked as Exhibit 60. It is C.P. Railway statement in respect of yard and road switching minutes to move grain and grain products in Western Canada, 1958.



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Stenason, Dir.
(McDonald)

2438

---EXHIBIT NO. 60:

Document entitled "C.P.
Railway statement in
respect of yard and road
switching minutes to
move grain and grain
products in Western Canada,
1958.

(Page 2440 follows)



Then there is Exhibit 61. This is a series containing three sheets and marked 403 in the lower right-hand corner and entitled "Canadian Pacific Railway, Grouping of Expense Accounts in the Cost Study and Methods used to determine Costs." Exhibit 61, with your permission.

---EXHIBIT NO. 61: Document entitled "Grouping of Expense Accounts in the Cost Study and Methods used to determine Costs."

MR. SINCLAIR: Then the next being designated 404 in the lower right-hand corner, consisting of two sheets, with your permission to be marked No. 62, document entitled "Canadian Pacific Railway. Results of Regression Analysis used in Cost Study."

---EXHIBIT NO. 62: Document entitled "Results of Regression Analysis used in Cost Study."

MR. SINCLAIR: With your permission, as Exhibit No. 63, Statement designated 405, and entitled "Canadian Pacific Railway. Variable Portion of Road Maintenance Expense applicable to the Study Traffic."

---EXHIBIT NO. 63: Document entitled "Variable portion of Road Maintenance Expense applicable to the Study Traffic."

MR. SINCLAIR: Then as Exhibit No. 64, Statement designated 406 in the lower right-hand corner, and entitled "Variable Portion of Equipment Maintenance applicable to the Study Traffic."



---EXHIBIT NO. 64: Document entitled "Variable Portion of Equipment Maintenance applicable to the Study Traffic."

MR. SINCLAIR: As Exhibit No. 65, Statement designated 407 in the lower right-hand corner and entitled "Canadian Pacific Railway. Variable Portion of Transportation Expenses applicable to the Study Traffic."

---EXHIBIT NO. 65: Document entitled "Variable Portion of Transportation Expenses applicable to the Study Traffic."

MR. SINCLAIR: The next document, designated 408, with your permission, to be marked as Exhibit 66, is entitled "Canadian Pacific Railway. Cost of Money for Investment in Road Property and Equipment applicable to Study Traffic."

---EXHIBIT NO. 66: Document entitled "Cost of Money for Investment in Road Property and Equipment applicable to Study Traffic."

MR. SINCLAIR: The next statement, designated 409 in the lower right-hand corner, entitled "Canadian Pacific Railway. Development of Cost for Lines Solely Related to the Study Traffic," with your permission to be marked as Exhibit No. 67.

---EXHIBIT NO. 67: Document entitled "Development of Cost for Lines Solely Related to the Study Traffic."

MR. SINCLAIR: Statement designated 410, with your permission to be marked Exhibit No. 68, entitled "Canadian Pacific Railway. Variable Cost of Traffic and General, Communications -- Rail, Rents



and Taxes (other than Income Taxes) applicable to the Study Traffic."

---EXHIBIT NO. 68: Document entitled "Variable Cost of Traffic and General, Communications -- Rail, Rents and Taxes (other than Income Taxes) applicable to the Study Traffic."

MR. SINCLAIR: Then next, and last but one, being a statement designated 411 in the lower right-hand corner, with your permission to be marked as Exhibit No. 69, and entitled "Canadian Pacific Railway. Development of Constant Costs."

---EXHIBIT NO. 69: Document entitled "Development of Constant Costs."

MR. SINCLAIR: Finally, the statement designated 412, with your permission to be marked as Exhibit No. 70, and entitled "Canadian Pacific Railway. Development of Constant Costs Portion of Size Related Costs."

---EXHIBIT NO. 70: Document entitled "Development of Constant Costs Portion of Size Related Costs."

MR. SINCLAIR: Q. Mr. Stenason, as to these exhibits which have just been filed with the permission of the Commission, being Exhibits 58 to 70, were these exhibits prepared by you or under your direction?

A. Yes.

Q. And are they correct to the best of your knowledge and belief?



A. Yes.

MR. SINCLAIR: Now, Mr. Chairman and members of the Commission, Mr. Stenason will deal with material contained in a memorandum in respect of "Results of Cost Study", which, as I said earlier, has been filed for some weeks, indeed, over a month, and has been in the hands of not only the Commission and their experts, but my friends and their experts. As in the case of the last witness, and as we have said earlier, quite a number of conferences have been held concerning this data with Mr. Stenason, who was the chief as far as Canadian Pacific was concerned in regard to the Study; he was in charge.

Q. Now, Mr. Stenason, is there a different concept in costing railway operations than in costing industrial operations?

A. The concept in costing railway operations is basically no different from that of costing other commercial activities producing joint products. In any commercial activity where a single plant produces a number of different products there arises the need for procedures which will distinguish the cost of the different products. For example, a station on the railway is used for carload and less than carload freight work as well as passenger work. A technique is required which will develop the variable cost of each of these three station services.

Q. Now, has Canadian Pacific had experience in costing railway operations?



A. Yes. Costing is not new to Canadian Pacific. For many years Canadian Pacific has used cost analysis as part of business management. Many of these analyses have been used as an aid in the making of just and reasonable rates by traffic officers.

Grain and grain products in Western Canada, moving at statutory and related rates, constitute a large segment of the traffic volume moved by Canadian Pacific. Because much of the plant and many operations are influenced by the movement of grain and grain products, the problems involved in costing this segment of traffic were less than otherwise would be the case.

Q. Now, did the importance of the traffic affect your work?

A. Yes; the importance of the traffic was critical in many decisions taken at the conceptual and technical levels. The proportion of grain and grain products moving at statutory and related rates on a revenue ton mile basis was 26.2 per cent of the total revenue of Canadian Pacific, and 42.2 per cent of the revenue ton miles of Canadian Pacific's prairie and Pacific regions.

Q. Did any other factors concerning the segment that you were costing arise? Can you give an example to the Commission how it affected you?

A Yes. The fact that each of the plants of Canadian Pacific in western Canada was developed as a result of the movement of this traffic or is completely tied in with the movement



of this traffic, as well as many of the operations of the company in western Canada, was also a factor to be taken into consideration.

Q. What about yard? Did that affect you in the concept and the work you did?

A. Yes. This was what I was referring to when I referred to the fact that operations of the entire Canadian Pacific, particularly in the prairie region, and to some extent in the Pacific region as well, tend to revolve around movement of this traffic; in other words, moving through yards there is continually a large volume of grain, which makes it much easier to identify the traffic.

Q. Anything else arising out of this as operating characteristics which you wish to draw to the attention of the Commission in connection with this?

A. It is possible to identify that part of the railway plant solely related to the movement of grain.

Q. Would you go on? Had the extent of Canadian Pacific operations any effect in the work you were doing?

A. Yes. The fact that Canadian Pacific is a railway which operates across Canada in widely different geographical areas with different operating and investment characteristics makes it possible to obtain a cross-section of railway costs under uniform maintenance practices without the difficulties which result when analyses are made involving a number of



different railways.

Q. Then, Mr. Stenason, why is it important that Canadian Pacific cost analysis for the movement of export grain in western Canada is confined to Canadian Pacific rather than a group of railways?

A. Because the thing that we are attempting to make so far as the variable cost of revenue expense or railway operations is concerned is the response of railway expense to changes in traffic volume and changes in size of plant. Frequently, when cross-section multiple regression studies are done on a number of different railways, there arises a possibility of bias in the results which stem from different maintenance practices between different railways.

Q. What is the usual practice in regard to cost analysis, for example, in the United States?

A. Most studies performed in the United States to arrive at variability of operating expenses are based on a number of different railway systems, and the level of maintenance expenses on each system may result from the financial position of the railway as much as from difference in operating characteristics.

(Page 2452 follows)



MR SINCLAIR: Q. Now, as a result of costing for grain in this way, confined as you have it to Canadian Pacific, were there any other specific advantages?

A. Yes, the large amount of traffic involved and the importance of the study warranted field work which would not have been justified if the volume of traffic involved was substantially less.

Q. What is the result of the field work in its impact on the study?

A. It made for a far more precise analysis than would have been possible otherwise.

Q. Now, you have said you introduced some of these refinements into the instant cost study?

A. Yes.

Q. Have cost studies without these refinements been used at other times or on other occasions which would not have the precision that flows from the refinements which you have here?

A. Yes.

Q. Where?

A. Cost studies without the benefit of extensive field work and without a number of the refinements have been used for management purposes and relied upon by the Board of Transport Commissioners.

MR SINCLAIR: Mr Chairman and Members of the Commission, a detailed cost analysis was made by



Canadian Pacific in accordance with the principles described in the memorandum regarding "Method used to develop the cost of handling grain traffic moving at statutory and related rates." That is a joint memorandum which also has been filed with the Commission for some weeks, and which has been in the hands of my learned friends and their experts, and that memorandum will be dealt with by another witness, but that is in some respects concomitant to the evidence being introduced by Mr Stenason, of course, as that witness deals also with the method and the results.

THE ACTING CHAIRMAN: They are complementary.

MR SINCLAIR: Yes, complementary -- to go together with, sir; yes. I should make clear, however, to the Commission and my friends that Mr Stenason is the man in charge of the Canadian Pacific's cost study, and he is prepared to answer any question of the Commission or of my friends at this time dealing with the material that has been in their hands for so many weeks, and arising also out of the discussions with the experts who they sent to Montreal to sit down with him for explanatory purposes.

Mr Chairman and Members of the Commission, a summary of the results of the study applied to 1958 was set out at pages 9 and 10 of the Canadian Pacific submission dated October 14th, and between the



time of the putting together of that document and the sending of it out and the preparation in final form of the precis certain corrections were made, and an amended summary has been prepared, and I would ask Mr Stenason if he would be good enough to read this amended summary. There is one figure to change in the figures that are before my friends, and that is the revenue figure. I gave this change to Mr Frawley on the opening day. It is the only figure that will be changed from those in the precis and the figures that flow from it.

MR FRAWLEY: You are not filing any new pages, Mr Sinclair?

MR SINCLAIR: No, I am not filing any new pages. The Commission has been supplied, for their convenience, with the pages as amended, but the changes are very slight and can easily be pencilled in by my friend in the same way as he did during court one day.

MR FRAWLEY: Yes, they are all pencilled in.

MR SINCLAIR: Q. Would you go ahead, please, Mr Stenason?

A. (a) Revenues -- Canadian Pacific received \$35,354,766. for transporting grain and grain products at statutory and related rates.

Q. Now, that figure is different from the figure that was filed in the precis. It is somewhat lower. What is the reason for the change?



A. It was brought to our attention by one of Mr MacKimmie's experts that we should check very carefully as to inclusion of inspection charges in the revenue figures. Upon checking it was found that we had made an error, and that we had included in our revenues inspection charges which Canadian Pacific collected from the shipper and then passed along to the Board of Grain Commissioners. Consequently, the revenues were reduced by the amount of \$253,000., which is the amount of the inspection charges involved.

Q. Would you go on, please?

A. (b) Work done -- Movement of this traffic resulted in 11,768,470,000 gross ton miles, 130,408,170 loaded car miles, 75,290,305 empty car miles and 174,524 switching hours.

Q. Yes. Would you now deal with the next heading in the summary, please?

A, We have under (c) a total showing the proportion of freight traffic revenues of Canadian Pacific Railway constituted by grain and grain products at statutory and related rates, and also the revenue ton-miles of grain and grain products at statutory and related rates, in relation to total system freight revenue ton-miles. This total shown in the revenues constituted 8.98 per cent of the system freight revenues, and the revenue ton-miles constituted 26.19 per cent of the total.

Q. That shows that revenues would be the



same figure as you mentioned earlier -- that is, \$35,354,766.?

A. Yes.

Q. The revenues, freight traffic for the system, \$393,823,285, and the proportion of grain to total revenues is 8.98 per cent, and that is the figure you have just referred to?

A. Yes, that is correct.

Q. Will you deal with the next heading in your summary, and that is the cost of transporting grain and grain products moving at statutory and related rates?

A. The total cost of transporting grain and grain products moving at statutory and related rates was found to be \$70,700,000. The variable cost was found to \$52,400,000.

Q. Yes, what are the particulars of the variable cost, please?

A. The particulars of the variable cost of the western grain traffic moving to export positions under the major general expense accounts were as follows:

Road maintenance	\$ 7,318,000
Equipment maintenance	11,423,000
Transportation	13,419,000
Communications - rail	645,000
Traffic and general	4,080,000
Joint facility rents, taxes and interest	15,485,000.



Q. Which makes a total of?

A. \$52,370.000.

Q. You mentioned earlier that the revenues were some \$35,354,766. Would you relate that to the cost that you have just spoken of?

A. In 1958 the relationship between revenue and cost for moving western Canadian grain to export positions is shown as follows:
Revenue, \$35,400,000 -- these are round figures --
Variable cost, \$52,400,000; and the deficiency on a variable cost basis is \$17,000,000. Then, Revenue, \$35,400,000; Total cost, \$70,700,000; and the deficiency on a total cost basis is \$35,300,000.

MR FRAWLEY: Mr Sinclair, on page 3 of the precis there must be some changes so as to correspond with the changes you gave me the other day. There is the proportion of grain to total, 8.98 per cent.

MR SINCLAIR: That is right.

MR FRAWLEY: The proportion of grain to total on page 3 of Stenason's precis is - - -

MR SINCLAIR: He changed that. It is obvious because the revenue figure changed by some two hundred and fifty odd thousand.

Q. Could we come back to the relationship of the revenues and costs on a ton-mile basis?

A. The revenue per revenue ton-mile is 0.50 cents. The variable cost is 0.74 cents, which makes a revenue deficiency on a variable cost



basis of 0.24 cents. The total cost is \$1.00 which makes for a total revenue deficiency on a total cost basis of 0.50 cents.

Q. Now, you mentioned that the difference on a variable cost basis totalled \$17 million, and on a total cost basis it was \$35.3 million; is that correct?

A. Yes.

Q. Yes, Mr Stenason; what would you say as to those figures -- that is, the \$17 million revenue deficiency on a variable cost basis?

A. Even if the revenues for the movement of grain and grain products at statutory and related rates were to cover the variable cost the rate still could not be considered compensatory.

Q. Are you saying that as a cost analyst or as a person who has given particular attention to the problem of pricing in relation to costs under varying circumstances?

A. I am saying it as both really, but certainly as a person who from time to time is asked for advice on the propriety of a level of cost used in the carriage of any appropriate level of traffic.

Q. Yes; go on.

A. It will be noted that the revenues from moving the western Canadian grain crop to export positions in 1958 fell short of meeting the variable cost incurred by the movement of this traffic by \$17 million which is a deficiency



of 0.24 cents per revenue ton-mile.

Q. Now, earlier in your evidence you said if the rates met only variable costs for this traffic they would not be compensatory. What do you say would be required to make these rates compensatory?

A. The revenues should cover not only the variable costs but also a portion of the constant cost.

Q. And in this case does that amount to many dollars?

A. When there is added to the variable cost a portion of the constant cost to arrive at total cost it will be noted that the revenue received for moving western Canadian grain to export positions in 1958 fell short of meeting the total cost by \$35.3 million.

MR SINCLAIR: Mr Chairman and Members of the Commission, the corrections that I referred to earlier between the time of the filing of the Canadian Pacific's submission on October 15th and the present, and the one correction that was made today involving the elimination of the inspection charges, resolves itself into a making of the following changes in the Canadian Pacific's submission of October 15th, which I think is Exhibit No. 47:

Page 15, paragraph 48, line 3 -- 0.73 cents
should read 0.74 cents.

Page 15, paragraph 48, line 4 -- 1.05 cents
should read 1.00 cents.



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2460

Page 16, paragraph 52, line 10 -- 1.05 cents
should read 1.00 cents.

Page 19, paragraph 60, last line -- \$35,538,000 should
read \$35,400,000.

Now, Mr Chairman, I want the witness to
turn to a discussion of the methods used, and
the application of those methods in arriving at
the costing material that has been put on the
record.

THE ACTING CHAIRMAN: I think, Mr Sinclair,
we will adjourn at this time.

--- Whereupon the hearing adjourned at 3.58 p.m.
to resume at 10.00 a.m., Tuesday, December 15, 1959.

ROYAL COMMISSION

ON

TRANSPORTATION

HEARINGS

HELD AT

OTTAWA

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INDEX TO EVIDENCE
AND EXHIBITS

Page No.

STENASON, Walter John

Direct Examination (resumed)

By Mr. Sinclair

2434 (Vol.17) - 2619

No Exhibits in this Volume.



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ROYAL COMMISSION ON TRANSPORTATION

Proceedings of hearings held in
the Court Room, Board of Transport
Commissioners Offices, Ottawa,
Ontario, on the 15th day of December,
1959

COMMISSION

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In the absence of The Honourable Mr.
C. P. McTague, Q.C., Mr. M. A.
MacPherson, Q.C. presided.

Commissioner R. Gobeil was also absent.



Ottawa, Ontario,
Tuesday,
December 15, 1959.

---On resuming at 10.00 a.m.

THE ACTING CHAIRMAN: All right, gentlemen, we will come to order. Mr. Sinclair?

STENASON, Walter J., Recalled:

DIRECT EXAMINATION BY MR. SINCLAIR (Cont'd):

Q. . At the conclusion of the Commission's deliberations last evening, I had informed the Commission that I was then turning to a discussion of the method used to secure the results of the cost study as they were summarized and placed on the record by Mr. Stenason.

Mr. Stenason in regard to the method used, I wish first to deal with revenue. How were the revenues determined, Mr. Stenason, please?

A. The revenue data for grain moving direct to export positions at Fort William and Vancouver were readily available by stations of origin for the year 1958 from the company records. Consequently, it was not necessary to take a sample in order to arrive at total revenues for this traffic.

In the case of revenues for grain and grain products being moved under the stop-off privilege, two separate waybills are prepared --



one for grain moving into a mill and the other for grain products moving out of a mill. It was, therefore, necessary to develop revenues by stations of origin for grain moving to milling points and grain products moving from milling points. This was done for the full year 1958. Basic information was extracted at milling points from local records. On Canadian Pacific these points are Keewatin, Winnipeg, Moose Jaw, Saskatoon, Medicine Hat, Lethbridge and Calgary. There is no distinction made on the original waybill of grain moving to a mill as to whether the movement is for export or for domestic purposes. However, if products are to move to export positions the statutory and related rates apply from the origin to the export positions plus a stop-off charge at the mill. The waybill covering the shipment of the products out of the mill must have on it the origin station of inbound grain. As a result, it was necessary to analyze all waybills covering shipments from a mill in order to arrive at the station of origin of the original shipment of grain. The preponderance of grain moving to a mill does so at the statutory or related rate; occasionally the local mileage rate is used and when this occurs the traffic is re-rated at the statutory level.

The above analysis showed the revenue accruing from the movement of grain inbound to the mills and grain products outbound from the mills.



Q. Mr. Stenason, in your view should the milling-in-transit cost be the total cost associated with milling-in-transit?

A. No, the appropriate cost to apply to milling-in-transit would be the variable cost, since milling-in-transit is a part of the total movement of grain and grain products at statutory and related rates, and is something which is incremental to that total movement.

Q. What was the total revenue for grain moving direct to the Lakehead in 1958?

A. The revenue from statutory grain moving direct to the Lakehead during 1958 amounted to \$20,005,214.

Q. Now, there is a change in that from the precis filed. Does that change result from the inspection charges that were collected from Canadian Pacific on behalf of the Board of Grain Commissioners which were incorrectly included in your figure previously?

A. That is right.

Q. That is the only reason for the change?

A. Yes.

Q. Now, that was revenue in 1958 to the Lakehead, and it was \$19,837,214. What was the revenue in 1958 on grain moving direct to the Pacific coast for export?

A. The revenue from grain moving direct to the Pacific coast ports for export during 1958



amounted to \$12,058,369, and once again that is a change resulting from the inspection charges.

MR. FRAWLEY: I have \$12 million something; what is it?

MR. SINCLAIR: \$11,973,369.

Q. What was the revenue in 1958 for grain and grain products moving under the stop-off privilege to the Lakehead?

A. The revenue from grain and grain products in 1958 moving under the stop-off privilege to the Lakehead amounted to \$2,634,968 and to the Pacific coast ports amounted to \$909,215.

Q. What about the inspection charges on that traffic?

A. They had already been removed.

Q. And the total revenue would be the sum of those four figures, would that be right, Mr. Stenason?

A. The total revenue shown in the study would be the sum of those four figures; however, that would not be the total revenue collected by Canadian Pacific in 1958 because of an increase in the stop-off charge which became effective on December 1, 1958; we applied a new rate to the total movement of the traffic for the year.

THE ACTING CHAIRMAN: Is that increase by the Board of Transport approved?

MR. SINCLAIR: It was the Board of Transport Commissioners, sir, as a result of the judgment of last November, that stop-off charges were increased



by 17 per cent, and as they became effective only in December it was necessary to increase the revenues on the full year basis, and the witness has said that is what was done, and the total as adjusted then became --

THE WITNESS: \$35,354,766.

MR. FRAWLEY: Those changed figures being sent to Washington?

THE WITNESS: They haven't been sent yet; I will send them, if you like.

MR. SINCLAIR: We told Mr. Frawley's experts by letter that the figures would be corrected when the evidence was presented by removing the inspection charges, which were \$250,000.

THE ACTING CHAIRMAN: We understood yesterday, I think, in connection with Mr. Frawley's man, that the experts were --

MR. SINCLAIR: What happened, I think it was Mr. MacKimmie's experts, who asked us to check carefully to see that we had looked into the accessorial charges, and they must have found this by looking at some of the waybills, because the waybills show the inspection charge, Mr. Chairman, and the way they are set out are no different than they are for advance charges on some railway waybills, and they suspected that they might have been taken into account, but I think what they were really trying to show was that they had been taken out. Mr. Stenason has



explained that they were taken out with the milling-in-transit, but we ascertained when they were posted for the Lakehead and Vancouver that this charge had carried through into revenue and, of course, Canadian Pacific or Canadian National are merely a collection agent for the Board of Grain Commissioners, and therefore there is no revenue accruing to the company for those inspection charges, and so we are grateful to our American friends for showing us that we had over-stated by a quarter of a million dollars on Canadian Pacific revenue accruing from that traffic, and we told them we would be happy to make that adjustment, which we have now done.

Q. Now, Mr. Stenason, turning to the method used to secure the cost of moving grain to export positions in Western Canada, first I would like to deal with that segment of cost which is termed variable, leaving for a later discussion the other part of the cost which is termed constant; the total making full cost or total cost. First, the variable cost; what steps did you take to develop the variable cost, Mr. Stenason?

A. The variable cost of the study traffic results from:

(a) The number of basic units of transportation service required in the movement of grain and grain products at statutory and related rates;



(b) The unit variable cost of providing such service; and

(c) The cost of facilities solely related to movement of the study traffic.

Q. What are the basic units?

A. The basic units of transportation service for costing are: Revenue ton-miles, loaded and empty car miles, loaded and empty gross ton-miles, loaded and empty car handlings, number of carloads, active car days, train miles, locomotive miles and switching time.

MR. SINCLAIR: Now, first I wish the witness, Mr. Chairman, to deal with the basic units of transportation service under revenue ton miles, loaded car miles --

THE ACTING CHAIRMAN: Mr. Stenason, in your discussion with your American friends, as you call them, was there any criticism of the basic units that you had taken?

THE WITNESS: I can't recall that they suggested any other basic units which might be of significance in costing. We certainly did have discussions on various tests on the basic units set forth here.

THE ACTING CHAIRMAN: But they suggested no new basic unit?

THE WITNESS: I can't recall any off hand other than the ones set forth here. I certainly don't have any in my notes.



THE ACTING CHAIRMAN: Thank you.

MR. SINCLAIR: Q. Now, dealing with these basic units of transportation service in the group, Mr. Stenason; revenue ton miles, loaded car miles, gross ton miles - loaded, number of carloads and loaded car handlings; how were they developed?

A. As with revenues, the company's records show the tons and numbers of cars of grain and grain products originating by station. As with revenues, it was necessary to trace the movement of milling-in-transit traffic. Revenues, cars and tons were all obtained from the actual waybills.

A routing pattern for the movement of cars of grain from each station was established by field studies. This enabled the route miles to be developed by railway subdivisions for the loaded movement from each station of origin to each station of destination. The multiplication of tons and the route miles from each origin station provided revenue ton-miles from each station and the number of loaded cars times the route miles from each origin station provided loaded car-miles from each station. The revenue ton-miles and loaded car-miles figures were thus developed for each subdivision.

Q. Mr. Stenason, would these routings take into account out of line hauls?

A. No sir, the routings were the normal



routings of the cars, and the field work was done by visiting various officers in the transportation department of Canadian Pacific in the West, starting with the chief dispatchers of the divisions, and the superintendent, and working up through the district counterparts of those to the senior regional officers in that department.

Q. Would it be correct to say, therefore, those were all based on normal routings and didn't take into account out of line movements that took place in the normal operation of the railroad on account of operating conditions or various changes that took place in the normal operation of the railway?

A. Yes, that is right; they didn't take into account any out of line hauls or any detours caused by incidents of one type or another.

Q. Weather.

A. Weather.

Q. Mishaps.

A. Mishaps. Gross ton miles for the loaded movement were then developed. Gross ton miles include not only the content ton miles but also the ton miles for the tare weight of the car. The tare weight is the weight of the car. The tare weight of box cars used in grain service was obtained by special study. This study showed that the average tare weight of box cars was 23.0 tons. The study was based on a sample of over 3,700 box cars used in grain service in



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(Sinclair)

2471

1958. The tare weight multiplied by the loaded car-miles gives tare ton-miles. Tare ton-miles added to revenue ton-miles gives gross ton-miles for the loaded movement.

The number of carloads of the study traffic was determined from the waybills. The number of loaded cars passing through each terminal on the Prairie and Pacific regions was developed from the routing of the traffic. This gives loaded car handlings at each terminal.

(Page 2474 Follows)



Q. Mr. Stenason, you mentioned earlier your discussions with the cost consultants of the grain trade in the provinces, and there were discussions concerning these basic statistics, and you mentioned tests that were suggested?

A. Yes, sir.

Q. Did you run these tests on your basic statistics?

A. Yes, we ran a number of tests on basic statistics.

Q. That were suggested by these people in your discussions?

A. Partly, and that we determined on ourselves.

THE ACTING CHAIRMAN: Were the others there at the same time?

MR. SINCLAIR: Oh, I would think not, sir.

THE WITNESS: Well, actually, sir, at our meetings we reviewed with the experts from the other side a number of tests we had already put into the results, and there were suggestions and one or two others which we have since done.

MR. SINCLAIR: Q. What were the results of those tests, both the ones you did yourself and the ones that arose out of your discussions and which were suggested by the Americans in the grain trade?

A. In every case the tests validated the results which are reported here, and in some cases showed that the basic units were slightly understated.



I have in mind particularly the routing analysis, and, as a result of actually tracing a sample of cars, we found that the basic units, the car miles and the gross ton miles were slightly understated in the sample.

Q. But, notwithstanding this, arising out of this suggestion of my friend's experts, you did not increase your basic statistics and therefore raise your costs?

A. No.

Q. You left it understated as it was?

A. Yes.

Q. Thank you. Now, what was the next group of basic statistics that you developed?

A. Gross ton miles empty, empty car miles and empty car handlings.

Q. Please tell the Commission how these basic statistics were developed?

A. The empty car movement attributable to the 1958 grain traffic was developed from a sample of prior empty movement of over 3,700 cars. Prior empty mileage on this sample east of Fort William was excluded.

The volume of train traffic made it possible to trace from the Company records the movement of empty cars used for handling grain. Ordinarily, cost studies are based on a proration of empty car miles to loaded car miles. However, in the present study, by actually tracing empty car movements for the study traffic a more precise method is being used.

Q. If you had used a proration of empty



car miles to loaded car miles, what would have been the result?

A. The data available to Canadian Pacific is for all freight cars, and if we had used a proration of empties in one direction to loads, that would have had a return ratio of 64.03 per cent. This compares with the empty return ratio actually found in the sample of 57.7 per cent.

Q. Would that have an effect on your cost?

A. That would have increased cost, that would have increased the basic statistics.

Q. It would have increased the cost of movement of grain to export positions?

A. Yes.

Q. Was that discussed with the American experts?

A. Yes, it was.

Q. Was that the normal method of developing these statistics that they were accustomed to?

A. Yes, as far as I know. This is the procedure which is widely used in cost studies.

THE ACTING CHAIRMAN: Was there any complaint by them? Did they complain about your tests?

THE WITNESS: No, sir, I don't recall any complaints.

MR. SINCLAIR: Q. Did they complain that you had understated your cost by using the method you followed rather than following the other one?

A. No, they didn't. I might add that a sample is a good way of getting empty return



movements where you have a normalized pattern, but when you are dealing with small segments of traffic, the prorotation method is the best.

Q. It is the best method in that case?

A. Yes.

Q. You were talking about this development of empty car miles and empty car handlings?

A. Yes. The tracing of empty car miles was by subdivision by direction of movement. Based on the 3,700-car sample, total empty car miles were similarly obtained. Gross ton-miles-empty were obtained by multiplying empty-car miles by the tare weight of 23 tons developed from the sample referred to earlier. From the sample total gross ton-miles-empty, empty car-miles and empty car handlings were obtained.

Q. That is the second time you have mentioned the sample of 3,700 box cars used in the grain service. Did you run any tests on the sample to validate it?

A. Yes, a number of tests were run on the sample, and the tests showed that the sample was very accurate indeed.

Q. That is the building to a total from the sample?

A. Yes.

Q. That is what you mean?

A. Yes, the sample when expanded obtained it.

COMMISSIONER MANN: Did you have a sample of cars from which you took the tare weight? Did you



take the tare weight from the equipment register?

THE WITNESS: We took the tare weight from the equipment register. Now, the tare weights are put into the register at the time when the cars are delivered from the builder, so it is put into the register at that time.

COMMISSIONER MANN: Then you agree, of course, that they are periodically checked and the tare weight is stencilled on the car?

THE WITNESS: I am afraid this is a question that I will have to defer. I believe that is correct.

COMMISSIONER MANN: You took your traffic from March on; you didn't take in any winter traffic at all?

THE WITNESS: No, the traffic covers the full year.

COMMISSIONER MANN: I was going to suggest that the tare weight would have been heavier in the winter time, would it not, with the build-up of ice, and so on?

THE WITNESS: It may well have been.

COMMISSIONER BALCH: They don't weigh them in the winter time?

THE WITNESS: No.

COMMISSIONER BALCH: When there is any chance at all of being overweight in the winter time they don't weigh them?

THE WITNESS: No.

MR. SINCLAIR: Q. Although, as Commissioner Mann said, if they did weigh them in the winter time



they would be heavier?

A. Yes.

MR. MAURO: We would be charged with that.

MR. SINCLAIR: Unfortunately, it snows in western Canada as it does in Ottawa.

MR. MAURO: We have to pay for acts of God.

THE WITNESS: I don't think there is any actual difference.

MR. SINCLAIR: That is the position, even on the conservative method of arriving at costs, without adding these various factors which are there but which have not been added into the cost.

Q. Would you go on, Mr. Stenason?

A. Active car days was the next.

Active car days for the loaded and empty movements for the study traffic were taken from the sample of 3,700 box cars. Active car days represents all the time the cars were under load plus the time of the related prior empty movement. All storage and repair times have been excluded from active car days. From the sample, total active car days for the total study traffic were obtained.

Q. Did you run tests on this?

A. Yes; the tests on active car days were part of the overall tests on the sample.

Q. The next basic statistic is train miles and locomotive miles?

A. Basic statistics kept by Canadian Pacific show train miles, locomotive miles, gross-ton miles, fuel and crew wages, and net ton-miles for each train-run operated. The statistics are



available by direction. From these basic statistics, the relevant data for the study traffic was developed.

The train-miles attributable to the study traffic were developed by determining the proportion, on a gross ton-mile basis for the train-runs on which grain was handled, that the study traffic was of total gross ton-miles on these train-runs. An adjustment factor was introduced to reflect the resistance characteristics of heavily loaded traffic such as grain in relation to more lightly loading commodities. Constructive train miles used to handle the study traffic were developed based on the average weight of trains on which the study traffic moved weighted by the proportion of the study traffic to total traffic on each train-run. Locomotive-miles were developed from the addition of train-miles and train-switching miles of the study traffic. A train-switching mile is when a way-train switches at a small country station.

MR. SINCLAIR: We had some discussion yesterday, Mr. Chairman, about these adjustment factors in regard to developing equivalent gross ton-miles when Mr. Bandeen was giving evidence.

Q. You were also referring to the method which Canadian Pacific follows in developing that in the answer you have just given?

A. Yes, that is correct; and, of course, Canadian Pacific dispatches trains and makes up trains in the equivalent car ton-miles, and they are closely checked by dynamometer car.



Q. I believe Mr. Bandeen said yesterday that they use a car factor. This is not the same type of thing?

A. No, it is not.

Q. This is a check, formula and check by dynamometer cars?

A. Yes. The formula used by Canadian Pacific was first developed in England and introduced to Canadian Pacific around the turn of the century, and has been modified since and has been found to be highly accurate.

COMMISSIONER BALCH: How do you arrive at that?

THE WITNESS: The equation is: Equivalent gross ton-miles equals Actual gross ton-miles times a factor which reflects the grade and other characteristics of the subdivision, times the tare weight of the car minus the contents in the car divided by 2.

$$EGTM = AGTM \left(\left(\text{Factor} \left(\text{Tare} - \frac{\text{Contents}}{2} \right) \right) \right)$$

MR. SINCLAIR: Q. This is a factor you say has been used for some time, modified from time to time, and then checked by a dynamometer car?

A. Yes.



Q. Now once again, did you run tests on these statistics?

A. Well, these statistics are actual and it was not necessary to run any tests. They are very carefully checked by the accounting department, for instance, the fuel and crew wages which are charged are adjusted from time to time by the accounting department on a monthly basis who check into all the various factors which might affect fuel cost, average unit, price of fuel.

Q. And was there any question of this in your discussion with your friends from the States?

A. Yes, this was reviewed.

Q. And explained thoroughly to them?

A. Yes, and explained to them thoroughly.

Q. Now, turning to the next group of basic statistics and that was switching times: How did you develop that?

A. Field studies to determine switching time of the study traffic were conducted by a group of operating and research personnel under the direction of an operating officer. The studies developed the time required to switch cars of grain and grain products. Switching is done at origin stations on branch lines by road engines. It is done by special switch engines at intermediate and terminal switching points, except for some small points where it is done by road engines.



The following table shows the amount of time required to switch cars of grain and grain products for the year 1958 under the following categories:

	<u>Engine Minutes</u>
1. Switching times for grain originating	1,724,248
2. Switching times for cars passing through yards	4,999,180
3. Switching times for cars handled at milling-in-transit points	1,344,471
4. Switching times for cars handled at terminating yards	2,403,514
Total -	10,471,413 or 174,524 switching hours

The total engine minutes were the number of cars of the study traffic handled multiplied by the average time required to move each car. The number of car handlings during each phase of the movement of the study traffic was obtained from the study of the basic units of transportation service described earlier.

Q. What steps were taken by the field study group to familiarize themselves with the characteristics and the various layouts in the yard where time studies were to be undertaken?

A. At the commencement of the switching study, the study team familiarized itself with the characteristics and the operations performed



in each yard. Elements of switching were established for each yard. Elements of switching are classification, industrial switching, transfers, scaling, repair track switching and shop track switching.

COMMISSIONER MANN: May I ask a question on this?

MR. SINCLAIR: Certainly.

COMMISSIONER MANN: The switching hours established were established under the present pattern of terminals?

THE WITNESS: Yes.

COMMISSIONER MANN: In your opinion would changes in terminals with such modernizations or things like that be able to cut down on the number of switching hours?

THE WITNESS: Well, that is quite a question for a non-operating man to answer.

COMMISSIONER MANN: Perhaps I should direct it to someone else.

THE WITNESS: I do not really know whether I can hazard a guess. I have seen figures in Canadian Pacific for the most modern terminals versus the older terminals but there are usually so many different factors at work in a terminal, for instance, more classification of cars at one point than another and, secondly, more work to be done on a train and it is very difficult for me to infer from these statistics. Undoubtedly there are advantages in modern electronic yards.



Of course, as to whether these advantages can be adequately gotten in the case of all points through which grain moves is another matter. At certain points there is a heavy enough traffic.

COMMISSIONER MANN: Are there any electronic yards on this system through which grain moves at the moment?

THE WITNESS: No.

COMMISSIONER MANN: Are there any under contemplation?

THE WITNESS: I think --

MR. SINCLAIR: I do not want to give evidence but --

COMMISSIONER MANN: Perhaps we might develop that later.

MR. SINCLAIR: We will have someone later on that. I think that would be a good question to put to Mr. Crump.

COMMISSIONER MANN: Very well.

THE ACTING CHAIRMAN: Mr. Stenason, at the Lakehead there are no terminal facilities --

THE WITNESS: No joint terminal facilities. We each have our own yard but each railway switches the other railway's cars to the elevators on its own tracks. That is the only type of joint effort. I believe there is some arrangement whereby there is some joint trackage laid but there are no joint facilities.

THE ACTING CHAIRMAN: We will ask further on that later on.



MR. SINCLAIR: Q. You were explaining to the Commission about work done in familiarizing themselves with the yard and what the field group did before they actually took the time studies for switching. Would you please go on?

A. At the commencement of each study, every yard foreman was interviewed by a member of the study team and instructed in the requirements of the study. The yard foreman was given a Yard Foreman's Work Report Card, Form T1 which is Exhibit 58, (Statement 400), and instructed to keep a complete record of all work performed during the shift, showing the time required to perform each assignment and the number of cars handled. At the completion of each shift the foreman reported to a member of the study team and the card was examined and then accepted. This was repeated in each yard and on each shift for the four-day period of the study.

The completed Work Report Cards were then processed and the work described on each card was segregated into the element of switching which properly described the work performed. Non-productive time, common to all types of yard, such as that incurred while awaiting instructions or lunch period, was segregated and shown under the heading of overhead time for each engine assignment. This overhead time was then distributed over the switching elements in direct proportion to the time that each switching element



bore to the total productive time for that engine assignment. From the information collected, a master summary was prepared to show all the elements of switching service performed during the four-day period, together with the time required by individual yard engines to perform each element of service and also showing the number of cars handled while performing each element of switching service. The summation of all the time spent performing each element of service and the total number of cars handled in each element established the total switching time and the total number of cars handled in each element during the four-day study period.

The total amount of time for each element during the four-day study period divided by the total number of cars which received that element of switching during the same period gave the average time per freight car for each element of switching.

Q. Now, how did you secure the switching time for the study traffic?

A. The combination of elements of switching service applicable to the handling of a through or local car of grain or grain products in each yard was provided by the yardmaster. To establish the total switching time involved in handling a specific car of grain in a yard, the average switching times per car developed for all the switching elements involved in handling that



car of grain were added. The same procedure was followed for the loaded car as for the empty car.

The yards were grouped on the basis of volume of traffic and individual characteristics of the yard. All the large yards were studied and certain yards were selected to represent other yards of the same general type. At each of the representative yards studied, switching times were developed for handling local and through traffic and the times developed for the representative yards were applied to the cars handled covering the group of yards that they were chosen to represent.

Q. When you mention a group of yards similar, could you give an example of that? Just, for instance, take group one.

A. Yes, Kenora was studied --

THE ACTING CHAIRMAN: I think it would be useful to know who studied it, how long it took, who were on the study and what the nature of the study was.

MR. SINCLAIR: I thought it might be of some assistance to the American experts to know what he meant by saying he took a group and I was going to ask him to give two or three yards in addition to the one study, why they were grouped so they were able to take them out in groups. Could you give an example of where in the major yards you go to other yards which were



the same and why you say they were the same.

A. Yes, Kenora was studied over a four-day period with our eight-man group headed by a superintendent.

THE ACTING CHAIRMAN: Is that spelled C-a-n-o-r-a?

MR. SINCLAIR: No, this is Kenora in Ontario rather than in Saskatchewan.

Q. Yes, Mr. Stenason?

A. The teams developed at Kenora, for instance, for classification, which is the making up and breaking of trains going through, were applied to both Ignace and Brandon first of all on the basis of the total volume of traffic through the yards. The total cars handled through Kenora in 1958 were 437,000; through Ignace 404,000 and Brandon 409,000. Secondly, the service performed is very similar. There was very little through switching performed at the three points and, furthermore, the switching was done for the main part on westbound cars. I was discussing there mainly the classification element in switching. In addition to that the yards were quite similar in layout and the mix of local industrial switching was similar, that is local industrial switching to classification switching is similar in the three yards.



Q. Would you go on with your explanation of the switching, Mr. Stenason?

A. The total switching time incurred handling grain and grain products traffic during the year 1958 was then developed. The following information was obtained from the study of the basic statistics of the grain movement covering both loaded and empty cars referred to previously:

1. Number of cars of grain loaded at intermediate stations on each subdivision.
2. Number of cars of grain loaded at yards.
3. Number of loads of grain and grain products and their related empty movement passing through each yard.
4. Number of cars arriving and departing in milling-in-transit service from milling-in-transit yards.
5. Number of cars of grain and grain products unloaded at terminating yards -- Fort William and Vancouver.

The time per car for services performed handling cars from point of origin to destination was then applied to the number of grain and grain product cars used in that service during 1958 giving the time spent switching the study traffic during 1958.

Q. How were the yards selected for the study groups?

A. The yards selected for study were grouped according to size and the functions .



performed at each yard.

Q. Now, looking at Statement 401, which is Exhibit 59 in these Proceedings, would you draw to the attention of the Commission, please, Mr. Stenason, the significance of the data there recorded?

A. Statement 401, or Exhibit No. 59, shows in Column 1 all the yards of Canadian Pacific in Western Canada which handle grain and grain products where yard engines were assigned. In Columns 2 and 3 the number of yard engine switching hours in freight service is shown -- that is, in all freight service -- during the year 1958, and the percentage of the total by yard. In Column 4 the yards where field studies were conducted have been segregated and ---

Q. Just stopping there, Mr. Stenason, does your evidence mean that this study group of eight men that you spoke of earlier was actually on the ground in each of these yards set out in Column 4 of Exhibit 59?

A. Yes, sir, that is correct.

Q. That is, Vancouver, Calgary, Moose Jaw, Winnipeg, Fort William, Saskatoon, Medicine Hat, Kenora, Red Deer, Souris and Assiniboine?

A. Yes.

Q. And the same eight men were doing the work, were they?

A. Yes, the same eight men did the work. They started in Vancouver in March after the study had been set up and moved eastward, making certain before they entered any yard that there was a volume



of grain which was a relatively normal volume of grain moving through the yard.

Q. Yes; would you go on, please?

A. In Column 5 is shown the percentage which the yard engine hours in each yard studied is of the total yard engine hours in freight service on Canadian Pacific's Prairie and Pacific Regions in 1958. It will be noted that the large yards accounted for 66.2 per cent of the switching where yard engines are assigned and this, together with 7.8 per cent in smaller yards studied through field work, makes a total of 74.0 per cent at yards covered by field work, the balance being developed from the information secured in the field study.

Q. Now, you said that these switching studies were conducted starting in March and continuing eastward until June?

A. Yes, until June, but there was one done in July. There was an additional yard added in July.

Q. Would you consider these months -- by the way, where did you start?

A. Vancouver.

Q. And you worked ---

A. --- east.

Q. Would you consider the months in which these studies were conducted representative of switching in these yards over the year?

A. No, sir, they would be representative of switching in these yards during the summer period.



We have tested the yard engine hours and cars through yards on Canadian Pacific during the winter period, and we find that the minutes per car handled are from ten to fifteen per cent higher during the winter than they are during the summer.

Q And was that higher switching time and the costs associated therewith taken into account in developing the variable cost of moving the study traffic as presented to this Commission?

A. No, sir.

Q. It could be done?

A. Yes, it could be done, although I would want a far more accurate estimate of the -- pardon me, I would want studies during the winter period. I would not want to rely exclusively on this overall ratio that we developed.

Q. But if you applied that overall ratio there could not be too much quarrel with it, could there?

A. No, I suppose not for these purposes, if the ratio was built on the basis of the field studies.

Q. That would be a plus factor of 10 per cent?

A. Yes, 10 to 15 per cent. It varies between yards.

Q. How was time spent in switching cars at way stations developed, Mr. Stenason?

A. There is this Exhibit 60.

Q. You would like to refer to Exhibit 60?



A. Yes.

Q. Exhibit 60, Mr. Stenason -- would you discuss that with the Commission, please?

A. Exhibit 60 shows the engine times in the movement of the studied traffic by yard and road crew assignments. It will be noted that this statement shows that 71.2 per cent of the total yard and road switching time incurred in movement of the study traffic in 1958 was at yards and stations covered by field work. The significance of this is in so far as yard studies were concerned we had actual experience for 71.2 per cent of the total switching work done on the study traffic, and had to rely on expansion of the estimates developed on a sample basis within the study for only about 28.8 per cent.

Q. Continuing on with our discussion of the winter and summer movements, Mr. Stenason, what proportion of grain moves to Fort William and Vancouver during the winter months?

A. During the winter months the cars of grain moving to Fort William constitute 29 per cent of the annual movement, while those moving to Vancouver constitute 44 per cent of the annual volume to the west coast.

Q. And you have said these higher switching costs in the winter time in western Canada were not included in the costs of moving the grain to export positions as presented to the Commission?

A. Yes, that is correct.



Q. I wish now to ask you again the question that I asked earlier: How was the switching time in the movement of the grain traffic at way stations developed?

A. Time spent switching cars of the grain traffic at wayside stations was developed similarly by a special study of time spent by road engines at representative stations in Western Canada. These studies were done in a similar manner to the yard studies in that road conductors maintained a log of the work done by them at wayside stations covering 176 trips during the spring and summer of 1959. The time spent switching cars of grain traffic at origin stations by road crews is included in the total figure of 174,524 switching hours previously referred to.

MR. SINCLAIR: Mr. Chairman, Mr. Stenason has prepared a table summarizing the basic output units that he has been discussing and which were developed for the purpose of this cost study.

Q. Would you please deal with this table now, Mr. Stenason?



A.

Table showing units of transportation service
of the study traffic for the year 1958

Revenue ton miles (000)	7,037,405
Gross ton miles (000)	11,768,470
Loaded car miles	130,408,170
Empty car miles	75,290,305
Number of carloads	155,180
Active car days	3,257,123
Switching time - hours	
Yard engine switching 135,360	
Road switching <u>39,164</u>	174,524
Train miles	4,295,602
Locomotive miles	4,530,586

Q. Is there any particular comment that you wish to make in regard to that table, Mr. Stenason?

A. I do not think so, except to point out that this summarizes all of the basic units of the transportation service which we used in costing and which we developed and previously described.

Q. We heard yesterday, Mr. Stenason, from Mr. Bandeen of certain traffic which is sometimes colloquially known as OCS, or on company account, movements. Did you take that into account?

A. Yes.

Q. Would you please tell the Commission how?

A. As described previously, the basic transportation units were developed for the movement



of the study traffic alone. It was necessary to take into account the cost of moving the share of non-revenue freight (materials transported for railway purposes such as fuel and maintenance materials) applicable to the study traffic. The adjustments to reflect the applicable proportion of non-revenue freight were based on the system-wide proportion of ton-miles of non-revenue freight excluding the passenger proportion to total revenue ton miles of freight. This factor was 3.954 per cent. The factor was applied to each of the output units of the study traffic listed in the table just referred to so as to secure the total output units associated with the study traffic.

Q. You have, then, Mr. Stenason, prepared another table restating the table you referred to a moment or so ago but reflecting the traffic moving on company account?

A. Yes. The output units so adjusted are shown on the following table:

Gross ton miles (000)		12,233,795
Loaded car miles		135,564,509
Empty car miles		78,267,284
Number of carloads -		
Grain	161,316	
Extra billing -		
milling-in-transit	<u>13,887</u>	175,203
Active car days		3,385,910
Switching time - hours		
Yard engine		
switching	140,712	
Road switch-		
ing	<u>40,712</u>	181,424
Switching time - miles		
(at 6.mph) Yard engine	844,272	
switching		
Road switching	<u>244,274</u>	1,088,546



Train miles	4,465,450
Locomotive miles	4,709,724

Q. Is there any particular factor which you wish to draw to the attention of the Commission in that particular record?

A. No, but I would like to point out that the effect of what we have done is to compute the loading and other characteristics of grain, and particularly the cost of moving the grain, to the cost of moving non-revenue freight. Grain is a low-cost commodity to handle, and this has the effect of introducing an element of conservatism in so far as the cost of moving non-revenue freight is concerned. There is another basis on which this can be done ---

Q. That is, another basis for adjusting for the factor of freight moved on company account?

A. Yes, that is correct.

Q. Yes, what is that?

A. The basis is to develop the gross ton miles of non-revenue freight including the loading characteristics of non-revenue freight, and develop on the proportion that gross ton miles of the study traffic is to total freight gross ton miles a factor to be used in so far as gross ton miles of non-revenue freight is concerned. Then, taking the average cost per 1000 gross ton miles of all the average on the system, and applying the gross ton miles of non-revenue freight applicable to the study traffic we have developed a cost of moving the study traffic's share of non-revenue freight of \$1,750,000 as opposed



to the cost which we have used in the study of \$1,220,000.

Q. Was this method that you have latterly explained one of the suggestions that your American friends made when you were discussing these things with them?

A. Yes, in a way. This was a point which was brought up by the first expert who spent time with us.

Q. That was who?

A. Mr. McWilliams who worked for Mr. MacKimmie. At that time he suggested we look at the traditional way in which the ICC developed the cost of moving non-revenue freight, so we went back through the ICC methods of developing the cost of moving non-revenue freight, and found this figure.

Q. You found this higher figure that you have referred to?

A. Yes.

Q. How much higher is it?

A. It is about \$500,000.

Q. And did you add that \$500,000 into the cost of moving the study traffic that has been presented to this Commission?

A. No, sir.

---Short recess.

(Page 2506 follows)



MR. COOPER: Mr. Chairman, I believe there is some question in the minds of one or more of the Commissioners as to non-productive time, and perhaps the witness now could give a more extended explanation of the non-productive time in yards in connection with the switching operations, and so on.

THE ACTING CHAIRMAN: Yes, if you would.

MR. SINCLAIR: Q. In the switching operations and time studies that we conducted in the various yards in Western Canada, Mr. Stenason, you used the phrase "non-productive time". Now, what do you mean by non-productive time?

A. Well, non-productive time is essentially that time when employees are on duty in which work, in terms of work being performed by a switch engine, is not being performed.

Q. That is, that the switch engines are not actually making switching moves at that time?

A. That is right.

Q. And those are eight-hour shifts, 24 hours a day?

A. Yes, in some yards, and some yards there are three shifts.

Q. And some yards there are not. Now, one of these periods would be the lunch period?

A. One of the periods is the lunch period, and another period is when the yard crew may be awaiting assignment.



Q. That would be from the yardmaster?

A. From the yardmaster.

Q. From the general yardmaster re-
arranging his work schedule in view of certain matters
that have come up in the yard?

A. Yes, that is right. A very frequent
cause of non-productive time is when a train arrives
in a yard and the tracks are blocked by an incoming
train so that the yard engine cannot get to its
switching assignment or can't continue on with its
transfer movement.

Q. For instance, if a large train came
in and they had to double it into a classification
yard, the switch engine would have to wait until
that work had been done over the cross-overs so
that it can then proceed with the actual classi-
fication of the cars?

A. That is right. I think that we
should point out that this is time which is quite
normal to the operation of the yard.

COMMISSIONER ANSCOMB: On page 13 you
have loaded car miles, 130 million; empty car
miles, 75 million; how does that compare with the
system ratio of empty on loaded car miles? Just
give it to me roughly.

THE WITNESS: I can get the figure for
you in a minute, sir. The ratio for the study
traffic on empty car miles on loaded car miles
on Canadian Pacific is 57.7 per cent; for the
system it is 51.6 per cent; for the Prairie and



the Pacific region of the Canadian Pacific it is 53.8 per cent, and the reason why the empty return ratio is so much higher in the case of grain and grain products results from the large volume of grain going to Fort William and the fact there is no traffic -- the fact there is not a large volume of traffic originating in Fort William which can go into the cars for westbound movement.

COMMISSIONER ANSCOMB: Can I ask you again, dealing with train miles you have 4,295,000, and locomotive road miles is 4-1/2 million, and that little difference there would be because of the shifting of the locomotive in the yard, or something like that?

THE WITNESS: No sir, the difference there is in train switching miles.

THE ACTING CHAIRMAN: Shunting, and so on.

THE WITNESS: The difference there is in train switching miles.

COMMISSIONER ANSCOMB: The difference there is in train switching miles?

THE WITNESS: The train miles here are simply the road movements, and in addition to the road movement there is train switching.

MR. SINCLAIR: Q. That is switching by road crews at way-stations?

A. Yes.

THE ACTING CHAIRMAN: Shunting.

THE WITNESS: Yes, that is really it; putting cars into the elevator and taking cars out



of the elevator.

THE ACTING CHAIRMAN: Thank you.

COMMISSIONER BALCH: I would like to clarify this in my mind. I believe I know what you mean, but just to get it clear, the train miles would be the mileage that the train was pulling, we will say?

THE WITNESS: Yes.

COMMISSIONER BALCH: The locomotive miles, then, would be the extra time taken for putting it inside, and so forth.

THE WITNESS: That is right.

COMMISSIONER BALCH: That clarifies it, I believe, in my mind, too.

COMMISSIONER MANN: Would the train miles be developed after the train has left the yard limits?

THE WITNESS: Yes.

COMMISSIONER MANN: So that the mileage within the yard limits is not computed into the train miles?

THE WITNESS: No, those are train switching miles and, of course, they are computed into the locomotive miles.

COMMISSIONER MANN: Thank you.

MR. SINCLAIR: Q. Now, Mr. Stenason, I forget whether I asked you whether overall in regard to these various matters there was any suggestion or tests by your friends from the United States that are employed by the grain



trade in the Western provinces, that would, if applied, have reduced any of your basic statistics?

A. No.

MR. FRAWLEY: I don't quite know why my friend keeps asking about that. What our experts think about the study will appear in due course. I got the impression, after I saw Mr. Banks and Dr. Borts -- which are the only two I am personally interested in -- that they just sat and listened to these explanations. Now, I don't want to make that as a categorical statement, either, but it is the impression I got after spending four hours with them in Montreal after they had completed a few days session with Mr. Stenason. I want to put on the record that I don't want the Commission to take too much from the fact that my experts sat mute without malice during the course of these meetings with the study people.

THE ACTING CHAIRMAN: They can speak for themselves.

MR. FRAWLEY: When they come there, or in cross-examination, or when they present their substantive statement.

THE ACTING CHAIRMAN: All this witness can say is that they said nothing.

MR. MAURO: They are waiting for certain information.

MR. FRAWLEY: That is precisely it. The day they met with us in Montreal they handed us a two-page memorandum of more material that



they wanted.

THE ACTING CHAIRMAN: All right.

MR. SINCLAIR: I would like to make it clear, Mr. Chairman, that while Mr. Frawley and Mr. Mauro did have two experts, namely, Mr. Banks and Professor Borts, they also had one other gentleman, but we have had other experts besides, some two or three from the grain trade, and what I was doing with the witness, and I think it is of assistance to the Commission to know whether after these people had spent some time looking at this data and having made certain suggestions, that notwithstanding the fact that these suggestions were taken note of --

THE ACTING CHAIRMAN: We have had evidence that their suggestions were applicable in certain respects.

MR. SINCLAIR: That is right, sir.

Now, so that there will be no misunderstanding, there were certain requests made to us following the meeting, which I think has been gone over some time ago, arising out of the meeting.

MR. FRAWLEY: I am not suggesting there has been anything dilatory in that regard; I just indicated when you were talking about these people accepting it all and having no objections to it, that I think it all has to be considered in the piece.

MR. SINCLAIR: I am very happy to know,



Mr. Chairman, and I am sure that the Commission is, that the experts that have been employed by the grain trade and by the Western provinces are going into this matter so thoroughly and are continuing to go into it thoroughly, and may well have suggestions or reasons for reducing the cost, or even for increasing the cost, and will, in either case, bring those forward at the same time. Mr. Mauro says, "I am sure they will."

THE ACTING CHAIRMAN: I think they have been fair so far; some of the suggestions have increased the cost.

MR. SINCLAIR: Yes. They were very fair and have been most co-operative in that regard, ,and I am quite sure they will continue to be so, and we hope to be able to explain to them any further points which they may have in mind at any time they wish.

Mr..Mauro calls to my mind that the mistake of having got the inspection revenues did assist to a quarter of a million dollars in the development of the true revenues.

THE ACTING CHAIRMAN: I had that in mind.

MR. FRAWLEY: That is what somebody calls lint picking.

MR. SINCLAIR: Q. Now, Mr. Stenason, having developed the basic data as you have explained it applicable for the movement of grain in Western Canada, what was the next step in the procedure of



developing the unit variable cost?

A. The next step was to develop the unit variable cost of the study traffic through analysis to behaviour of railway operating expenses.

Q. How is the unit variable cost developed?

A. The operating expenses of Canadian railways are accounted for under the Uniform Classification of Accounts prescribed by the Board of Transport Commissioners. Each account may represent the expense of a number of different services. All expenses incurred in the operation of stations, for example, are accounted for in accounts 373 and 376, Station Employees and Expenses; such expenses are incurred in the handling of less than carload, and carload freight traffic as well as passenger traffic.

The operating expenses of Canadian railways are classified under the following general accounts:

1. Road Maintenance - this is the cost of maintenance and depreciation of fixed railway facilities such as track, bridges, station and office buildings, and shops and enginehouses. Supervision and other overhead expenses of Road Maintenance, including injuries to persons, insurance and stationery, are dealt with under this general account.



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Stenason, Dir.
(Sinclair)

2514

2. Equipment Maintenance - This is the cost of maintenance and depreciation of railway rolling stock such as locomotives, freight and passenger cars, work equipment and shop and power plant machinery. As for Road Maintenance, the supervisory and other overhead expenses pertaining to Equipment Maintenance are included in this general account.

(Page 2518 follows)



3. Transportation -- These are the costs of operating trains, yards and stations incurred by the movement of traffic and the associated overheads and supervisory expenses.
4. Traffic and General -- Traffic expenses are those incurred in securing traffic and pricing railway services. General expenses include items such as salaries of general officers and clerks, and pensions.
5. Joint Facility Rents and Taxes (other than Income taxes) -- This includes property taxes and the net of rentals for facilities used with other railways.

Q. As is known, under the classification and under the general accounts you have just mentioned are primary accounts. Did you group those primary accounts for study purposes?

A. Yes. Under each of the general accounts just described, the expense accounts in the Classification have been grouped for study purposes. Account 266 -- Road Property Depreciation has been distributed to the associated road maintenance accounts on the basis of gross property investment by primary investment accounts. Account 331 -- Equipment Depreciation is distributed to the associated classes of equipment in the accounts of the Company. The depreciation rates by primary accounts are approved by the Board of Transport Commissioners.

Q. We have filed here earlier as Exhibit No. 61 a document of some three pages which shows, does it not, Mr. Stenason, a breakdown of these



primary accounts in the groups which you have been referring to?

A. Yes.

Q. And it also shows the name of the accounts and the method used in distinguishing the cost which is associated with the movement of grain and grain products to export positions in western Canada?

A. Yes, that is correct.

Q. Before I leave that, you made reference to Account 266, and that was a depreciation account. I think it would be of interest to the Commission to know that here was an example of where a question was directed to us from one of the American experts concerning the spreading of depreciation?

A. That is correct. We have, in developing our regression analysis on road maintenance expense, included depreciation with the maintenance by account. In other words, in the case of track maintenance, we have included all elements of depreciation relating to track structure, and in the case of maintenance of stations and office buildings, we have included depreciation of stations and office buildings.

Q. For instance, Mr. Stenason, there is a marked difference as to how track structure is depreciated under the Canadian classification of accounts and the practice under the United States method?

A. Yes, that is correct. Under the United States classification of accounts a high



proportion of the materials which go into track structure, for example, rails, are put into expense, whereas in Canada the rails are depreciated along with most other elements, a material expense.

Q. Ties, other track material?

A. Yes, ballast, ties, grade, structure, and so forth; and the American experts suggested that when we had taken our total system depreciation rate for each element of property investment and applied the rate to the property investments by division of Canadian Pacific which is available, that we had not recognized the fact that these depreciation rates were really composite rates. For example, new rail in the main line has a shorter life than relay rail in the branch line, and consequently a higher depreciation rate might be used in the case of new rail than in the case of relay rail in the branch line.

COMMISSIONER ANSCOMB: In other words, they were again raising your costs?

THE WITNESS: Well, sir, this is a long and detailed explanation. I am not sure what it does.

In so far as rail is concerned, then there are other things which offset it. Rail has a higher depreciation rate on the main line than on the branch line, but then the grading and the ballasting and the track surfacing has a longer life in the branch line; it is depreciated over 140 years, and the main line is depreciated over 100 years.



Similarly, there is a difference in office buildings, but these vary, whether it is a brick structure or a wood structure. We know that most of the stations and office buildings in branch lines are wooden and therefore they have a shorter depreciation life and higher rate; in the case of the main line they are more brick buildings with a longer service life and a lower depreciation rate.

MR. SINCLAIR: And some of the stations in the main line had insul brick put on them.

COMMISSIONER ANSCOMB: Yes.

THE WITNESS: So we tried, at the suggestion of our American friends, to find out where in Canadian Pacific we had new rail and where in Canadian Pacific we had relay rail, and where in Canadian Pacific we had wooden structures and where in Canadian Pacific we had brick structures and where we had timber trestles and steel trestles, and this proved to be an impossible job on the basis of the records we have available in Montreal. In order, in fact, to do this it would require very extensive field study, but we did a number of checks and our engineering department made a number of estimates which were quite broad. They said: Let's assume everything in the branch line is relay rail, and let's assume that everything in the main line is new rail, and then we knew that the track surfacing and roadbed was depreciating over 140 years in the case of branch lines, and 100 years in the case of main line, and I changed the input data and



the information that I had in the regression analysis and I came up with almost the identical results which I had before. I think my mile of track size cost went down by about \$17, and the gross ton-mile cost per thousand gross ton miles went up by .004. They tended to be offsetting. We haven't made any revision or adjustment for this because we are still not certain as to the specific way these different elements are properly located.

MR. SINCLAIR: Q. You are satisfied to leave the figures as you have them on the tests you made?

A. Yes. The tests I made indicate it balances off, it offsets, working in both directions.

Q. Was there any other comment that you would like to make on Exhibit 64 before we go on to the next point?

A. Well, as Mr. Bandeen did, I would like to draw the Commission's attention to grain elevators, which you say are not applicable to the movement of grain and grain products. It is the grain elevator located at Port McNicoll, Ontario; it has nothing to do with the movement of grain under statutory and related rates. It is a terminal elevator.

Q. Grain there is not fixed by statute?

A. No.

MR. FRAWLEY: In Exhibit 61 in the column headed "Method" the witness seems to use, about three times, regression analysis, not applicable, allocated,



not variable, direct. I wonder if this is a good time for the witness to explain what those expressions mean?

MR. SINCLAIR: Yes, we would be glad to.

Let me, Mr. Frawley, first ask the witness to tell the Commission what methods were used in securing the variable cost of grain and grain products moving to export positions in western Canada.

THE WITNESS: Well, three methods were used: direct analysis; regression analysis; allocation. What Mr. Frawley is reading from is a complete listing of our accounts.

MR. SINCLAIR: Q. Before we come to Mr. Frawley's question, Mr. Stenason, you say in arriving at the unit variable cost you used direct method, regression analysis and, thirdly, allocation. Now, what percentage of your costs arose from direct costing?

A. 48.9 per cent.

Q. Direct resulted in 48.9 per cent?

A. Yes.

Q. Secondly, regression analysis, what is the percentage there?

A. 37.7 per cent.

Q. And the third group, allocation, what is the percentage?

A. Allocation was 13.4 per cent, and I think that adds up to 100.

Q. Now, before we go to discuss these various types of costing method, technique, would you please, looking at Exhibit 61 -- and this is Mr.



Frawley's question, in part -- when you say "not applicable", you have explained that, I think. "Grain elevators -- Not applicable", line 14, on page 1 of Exhibit 61 -- "not applicable". You have mentioned that in Canadian Pacific is a grain elevator at Port McNicoll; and "Wharves -- Not applicable." Why wouldn't they be applicable?

A. The wharves are mainly the cost of very extensive wharves which Canadian Pacific has in Vancouver which are not used by grain and grain products.

Q. They also in Eastern Canada have some coal wharves?

A. Yes, there are coal wharves in Eastern Canada.

Q. And that isn't tied into the movement of grain in Western Canada?

A. No.

Q One other phrase which you use in Exhibit 61, sheet 1 -- let's take line 21, which shows "Not variable."

A. Yes. I will take No. 24, Account 272. We tried regression analyses literally by the score on removing snow, ice and sand, and, oddly enough, we found the only factor which was really significant was in relation to snow-fall, and we did not develop coefficients relating to gross ton-miles and yard or train-switching miles. So we concluded that the moving of snow, ice and sand was not variable with traffic volume; and



then we launched forth into districts with the operating people who felt that it was highly variable with traffic volume. But we could find no statistical evidence to support that the movement of snow, ice and sand was variable.

Q. So, as a result, instead of continuing your searches for a model which would result in significant results as to variability, what did you do? Does that mean it goes to constant?

A. Yes, it is in constant cost.

Q. So even though the operating people say that Account 272 does have a variable factor, you have decided in this case to treat it as all constant?

A. Yes, that is correct. Of course, I am not willing to agree that it is variable.

(Page 2530 follows)



COMMISSIONER BALCH: Mr. Frawley, you mentioned "allocated" too.

MR. FRAWLEY: Yes, he has not got to dealing with my question yet, as I understand it.

MR. SINCLAIR: I have dealt with "not applicable" and "not variable". I am going on to deal with each of the three which were actually used in developing the unit variable cost in the cost study.

MR. FRAWLEY: My question is a very elementary one, just a definition and that is what the witness will do, in the regression analysis to define "allocation".

THE WITNESS: We have that in the precis which is about to follow. I can define the others.

MR. SINCLAIR: Q. If it would assist Mr. Frawley and he wants it then we will do it over again: Would you define direct costing?

A. Where it is known that any category of expense varies completely with the study traffic, this expense can be secured by the direct method if the accounts segregate the expense. For example, fuel and crew wages are directly traceable to the operation of trains on which the study traffic moved. These items of expense vary completely with the study traffic. The direct method is also used where the expense is incurred solely because of the movement of the study traffic and is segregated in the accounts. This is the case with loss and damage - grain and also grain doors.



MR. SINCLAIR: Now, would you like a more definitive definition, Mr. Frawley?

MR. FRAWLEY: That is a definitive definition if there can be such a thing as that.

MR. SINCLAIR: Q. Would you deal with the regression analysis?

A. Regression analysis is the method used to identify the separate effects of changes in the volume of different types of transportation service on cost where the cost is incurred jointly. Where cost is incurred jointly some element of that cost cannot be traced to any single type of transportation service. This becomes a constant for the account under review, that is, other than a variable cost. There are two types of regression analysis used in the study, simple and multiple. Simple regression is where one variable explains the variation of the expense under analysis. Multiple regression is where more than one variable is required to explain the variation of the expense under analysis. Whether simple or multiple regression is used depends on the content of the expense item as well as the statistical relationship appertaining. For example, simple regression analysis was used for yard expense because the quantitative factor influencing variable yard expense is yard engine miles. On the other hand, three different transportation services, passenger, less-than-carload freight and carload freight are the factors influencing variable station expenses.



Q. When you are studying variable station expenses did you use these variables that you just mentioned?

A. Those were the three variables that are contained in our final model that we found to be the best variables.

Q. Would you go on with your explanation of regression analysis?

COMMISSIONER MANN: Would not express expenses also enter into station expenses?

THE WITNESS: Yes, they did and we did a test in order to check out our regression model and station expenses. We went to Western Canada and we examined a sample of stations, we examined about 75 stations stratified by large stations, intermediate and small stations and we used proration methods to find out the amount of employee time spent on each of the services performed. We did find an amount for communications and express. Now, this test showed that the regression analysis had developed the carload cost and the l.c.l. cost and the passenger cost which was not too greatly different from that developed from the proration methods. Actually the regression analysis was a little less in terms of unit cost. We had a very large constant cost in this regression analysis, that is cost unexplained by any of the output variables included in the analysis. I could only conclude from this test and also from the theory of regression analysis that the expenses of



communications, express, etc. are in the constant cost and, therefore, are not charged to the study traffic. That is a rather long-winded explanation but it is necessary.

MR. SINCLAIR: Q. Now, I would like you to deal with the first step that you take in using the regression analysis technique.

A. The first step in regression analysis is to secure from the records basic data that meets the requirements of the analysis. That is to say that it is complete, adjusted to uniform price and wage levels and is linear within the range of observations on which the regression equation is calculated.

Q. Are all operating expenses on Canadian Pacific taken to account on the division level?

A. No sir.

The operating expenses of Canadian Pacific were accounted for at three administrative levels:

1. Division level.
2. District level.
3. Regional and System levels.

I say "were" accounted for because since this study was completed and early in 1959 the company eliminated the district level in so far as supervision and accounting is concerned so at the moment we have expenses on only two levels, the division level and the regional and system levels. When the study was done there were three levels.

Q. For your regression analysis you were



using what specific years for data?

A. 1956, 1957 and 1958.

Q. And in 1959 there has been an administrative re-organization of Canadian Pacific?

A. Yes.

Q. In which the district level has been done away with and C.P. now have a headquarters division.

A. Yes.

Q. Regional and divisional?

A. Yes.

Q. Now, with all the expenses taken into account at one or other of the three administrative levels in the years 1956, 1957 and 1958 which is the back basis data for your study.

A. Yes, sir.

All of the expenses of Canadian Pacific are taken to account at one or other of these levels. The Road Maintenance and Transportation accounts are taken to account at the Division level. Equipment Maintenance expenses are taken to account at the District and System levels. Traffic and General expenses as well as depreciation and insurance are taken to account only at the System level. In addition to the Road Maintenance expenses taken to account at the Division level, there are supervisory and other expenses of Road Maintenance dealt with at the District, Regional and System levels. These reflect supervision extending over all Divisions, Districts or Regions.



Q. When you took into your regression considerations the expenses, as you have said, for the years 1956, 1957 and 1958, why did you go to three years instead of just taking 1958?

A. This was done to remove from the regression analysis any influences peculiar to the year 1958. That is particularly important in the road maintenance accounts where you can have floods or some climatic factors which will affect the maintenance cost in one year.

Q. Yes.

A. Because of changes in price levels during this period it was necessary to re-state the data in terms of price and wage levels prevailing on December 31, 1958. In this way a constant dollar base for the regression analysis was obtained.

COMMISSIONER PLATT: In your regression analysis your district expenses were the basic figure, were they not?

THE WITNESS: In some cases. In most of the regression analysis, particularly on road maintenance, the basic data was at the division level. This gave us approximately 31 observations.

MR. SINCLAIR: The division is the lowest administrative level?

THE WITNESS: Yes, that is correct.

COMMISSIONER PLATT: The "N" was 31 there?

THE WITNESS: Yes, the same regression equations were run with the terminal equations, in some cases there were 31 and in some cases 27.



COMMISSIONER PLATT: In regard to the years, did you treat each year individually or did you use averages?

THE WITNESS: We took three-year totals and ran the regression equation of 31 and adjusted the constant to put it on a one-year basis. It makes no difference whether you average the three years or take the three-year totals. We had something in our minds which made it a little easier for us to take the aggregate data for the three years.

COMMISSIONER PLATT: Well, you could get extra information by considering your three years, could you not?

THE WITNESS: You mean as three separate observations?

COMMISSIONER PLATT: Yes.

THE WITNESS: Yes, and I got that with a number of regression equations particularly in the shop and engine house expenses where we did observations only at the district level. What I did here was to take one district with three separate observations and I then plotted the residuals on the regression equations which is the difference between the actual and projected values and made certain that wherever one of these was used, and it was used in one place, that the residuals were truly independent for the same district for the three years. Of course, I prefer to have more observations to work on provided the assumptions of randomness were not interfered with.



COMMISSIONER PLATT: Thank you very much.

MR. SINCLAIR: Q. Now, you dealt with road maintenance, you said they were taken into account at the division level and you also dealt with the other groups of expenses, did you not, as to which level they were taken into account?

A. Yes, I had finished that section.

Q. Now, we had a little earlier discussion about depreciation as to account 266 for road depreciation and you explained that. Is there anything else that you wish to say about depreciation in road maintenance at this time?

A. I think that was covered by my earlier explanation. What we did was to take our maintenance expenses by division by account and our property investment by division by account and apply the system depreciation rate to the property investment in each account in order to come up with the depreciation charges which were added to the maintenance charges in which the regression equation was run. This in effect treats the depreciation as a type of maintenance expense, in other words, it represents the physical using up of assets and maintenance represents the replacing of and using up of assets.



Q. Well, now, what does the regression analysis provide?

A. The regression analysis provides a coefficient of variable cost and a constant cost for each account or group of accounts where that method of distinguishing joint costs is used.

MR. FRAWLEY: Is that expression "coefficient of variable cost" explained at any place further on? If so, I will not ask ---

THE WITNESS: No, it is not explained further on.

MR. SINCLAIR: No, I do not think it is. Would you like to have an explanation on the record?

Q. Mr. Frawley says he would like an explanation of "coefficient of variable cost". Would you please explain that phrase, Mr. Stenason?

A. Yes, the ---

THE ACTING CHAIRMAN: We are certainly getting cooperation this morning, Mr. Sinclair.

THE WITNESS: The coefficient of variable cost, Mr. Frawley, emerges from the regression equation. To explain it I have to explain a little about what a regression equation does. Regression analysis is essentially a way of inferring from variation in expenses by division, and variation in output units of different types of transportation services by division, the cost of an additional unit of one type of transportation service holding constant the volume of other types of transportation service produced. The



coefficient which emerges from the regression equation is a number which comes through the solution of a series of simultaneous equations, each of which is developed from calculus and is designed to show the quantity of the particular value of the equation which will minimize a functional relationship between the predicted and the actual values.

Now, the regression equation, or the coefficient of variable unit cost, is, therefore, that part of cost which varies with changes in the particular traffic volume to which it is attached.

COMMISSIONER BALCH: I hope you understand that, Mr. Frawley.

THE ACTING CHAIRMAN: It is very efficient; whether it is coefficient or not is another matter.

COMMISSIONER PLATT: I would like to go back one paragraph in this depreciation problem here. As I understand it, the depreciation figures are on a system basis. I think you mentioned that earlier this morning?

THE WITNESS: Yes, sir, the total amount which emerged in the accounts at the end of each year is on a system basis.

COMMISSIONER PLATT: Then, in developing the regression equation you have to develop this cost according to the size of the plant in each division?

THE WITNESS: According to the investment in each division. Canadian Pacific has an excellent set of property investment records. I understand



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(Sinclair)

2544

they are possibly the best set of records in North America of any railway, and we have the actual dollars by division on property account of investment. In other words, we know what the investment in rails is; we know what the investment in ties, stations, office buildings and water and fuel stations on the system for each division is. So, what we did was to apply the system-wide depreciation rates to the investment in each division, and then we had to make sure that it balanced at the end because the total investment has to balance. Therefore, the total depreciation charge is balanced for the system.

THE ACTING CHAIRMAN: I think we will adjourn now.

---Luncheon adjournment.



---On resuming at 2.00 p.m.

THE ACTING CHAIRMAN: All right, Mr. Sinclair.

MR. SINCLAIR: Just before the noon adjournment my friend Mr. Frawley asked Mr. Stenason to explain the coefficient of the variable cost, and Mr. Stenason did so, and I made a little note here which puts it in possibly closer to barristers' terms than statisticians' terms, and I thought possibly I would ask the witness if he would consider it again and see if this was a correct way of explaining it.

Q. Mr. Stenason, you developed the expenses by divisions, and I believe you told Commissioner Platt there were some 31 divisions?

A. Yes.

Q. And from that you developed scattered diagrams, did you?

A. Yes.

Q. And then, having looked at those scattered diagrams and having come to the conclusion that they were linear, you fitted a line?

A. Yes.

Q. And the line was fitted, was it, by the technique known as least squares?

A. Yes.

Q. And the slope of that line would show the coefficient of variable cost, would it?

A. Yes, the slope of the line is the coefficient variable cost. You are talking now about a simple regression because there is only



one variable. In the case of multiple regressions this line has to be set off in terms of a plane of a three dimensional service. Multi-dimensional service is a number of variables increased.

Q. And the line is fitted by the solution of equation?

A. Yes.

Q. And the various points on the line would reflect on one of the axes of the graph the output variables which you were dealing with?

A. Yes; various points in the graph would represent the output variables and the expense variable for that particular division. On the scattered diagram you have 31 points of simple regression, each representing the expenses of the output for a division.

Q. Is there anything else that you could say about this that would maybe be of assistance to barristers who are anxious to understand it?

A. Well, I think if you are typical of all barristers and you understand it ---

Q. No, I am not. I was thinking of Mr. Frawley and my friends, whether there is anything further you feel should be said about this at this time that would make the understanding a little more easily grasped.

A. One point I mentioned this morning which wasn't mentioned now, was the number of tests which can be made on the residuals from a regression equation. The residuals are the difference between the actual expenses and the expenses predicted



by the estimating equation for each division.

These residuals should be randomly distributed and there should be no observable pattern in the residuals as one moves, for example, from east to west from the divisions of the railway, or as one moves from relatively low density divisions to relatively heavy density divisions.

Q. Now, I think with that explanation on the record that we might turn to Statement 404, which is Exhibit 62. Having that before you, would you please draw to the attention of the Commission the significance of this tabulation?

A. Exhibit 62 shows the constant cost and the coefficient developed by the regression analysis for each account or group of accounts where this method was used. It should be noted that in each case the coefficient of variable cost is expressed as a unit cost.

The cost coefficients shown in Exhibit 62 reflect the variable cost of an additional unit of traffic. The regression analysis was based on expenses at the lowest available administrative level. Expenses at the division level do not contain the District, Regional and System expenses.

Q. Then, how did you take those expenses into account that were not reflected?

A. The adjustment to reflect expenses not included at the Division level was made through adding for years 1956 through 1958 for each account analyzed the total expenses at the Division level



and taking the ratio of total System expenses in the account to total expenses incurred at the Division level. This ratio was applied to the coefficients developed from the Division data to reflect expenses taken to account at the District, Regional and System levels. This procedure was applied to the ratio of District to total System expenses where the regression analysis was based on District expenses. The nature of the expenses not included in the regression analysis in each of the accounts is such that they vary in the same manner as the expenses included.

It will be noted from Exhibit 62 that all supervision expenses are related to appropriate direct expenses.

Q. Will you give an example, please?

A. For example, supervision of Road Maintenance, Account 201, was associated with direct expenses to the extent of 3.586 cents per dollar of direct expenditure. In the case of equipment, this figure was 4.99 cents per dollar of direct equipment expense. The analysis was based upon Division direct expenses only in the case of Road Maintenance and District expense in the case of Equipment. In reflecting this expense a factor was added to each of the direct expenses to provide for supervision.

Q. Here again, and before we hear your explanation of regression technique as it was used in your determination of costs, were there tests which you applied to consider the validity of the



models and other equations you had taken in this regression analysis?

A. Yes, but I can first point out that in order to develop approximately 15 final regression models, several hundred different models were run in our IBM equipment. These took about 32 seconds per model, so we were able to do a good deal of testing by using virtually every combination of output variable that was available to Canadian Pacific.

In addition to that, the standard statistical tests were applied to the models, and these are really two in number; first of all the value of R^2 which represents the goodness of fit of a statistical model to the data and secondly, the t test which is an indication as to the statistical significance of a variable. The t test is also a test as to the existence of co-linearity in a statistical relationship. By co-linearity is meant the relationship between two of the independent variables which may exceed the relationship between each of the independent variables and the expense variables taken separately.

Furthermore, the residuals which I have described earlier were plotted and carefully examined to determine that they were, in fact, randomly distributed as between different divisions of Canadian Pacific.

Q. Now, Mr. Stenason; you have explained the direct and the regression methods; now, would you please turn to the allocation method, which



was the third of the three methods you used in determining the costs of moving grain to export positions in western Canada?

A. Allocation is the method used where the degree of variability has been established or where data for direct or regression analysis is not available. For example, the expense covered by the total of Traffic and General, Communications-Rail, Rents and Taxes (other than Income Taxes), excluding those attributable to passenger service, is allocated between the study traffic and other freight traffic on the basis of the variable and constant costs of each excluding the expenses of Traffic and General, Communications-Rail, Rents and Taxes (other than Income Taxes).

Q. Looking at Exhibit 61, and under the third column "Method", in a number of instances there are combinations of methods against the account, or complex of accounts listed in the first column, and would you please speak to that and say why that was done?

A. Yes. A good example of that is line 34 on sheet 1 of three sheets to Exhibit 61, which is Account 314 and 331, freight train car repairs and depreciation.

Q. Under the classification, am I correct that 314 is freight train car repairs and 331 is equipment depreciation?

A. Yes, that is right. We show freight train car repairs and depreciation as having been



handled through both direct and allocation methods. The total extent of freight car repairs and depreciation are available directly in the accounts of the company. The allocation was made on the basis of a time and repair operation. Now, so far as repairs are concerned --

Q. Time and repair operation, yes.

A. Seventy per cent of the total cost of freight car maintenance was allocated to mileage -- that is, car mileage -- and 30 per cent to time or car days. This is practised in the United States, and the factors of 70 and 30 were in fact developed by U.S. studies, which were carefully checked by the maintenance and equipment officers of Canadian Pacific.

Q. That is the same thing that was dealt with by Mr. Bandeen yesterday?

A. Yes, that is right.

Q. In your explanation you use the term "allocated"; is that synonymous with the term "special study"?

A. Yes, in some cases. Where we used allocation procedures we had a number of special tests which we based on special study to check the validity of the allocation procedure.

Q. Now, is there any other category of cost which is a part of variable cost, Mr. Stenason?

A. Yes, the cost of facilities solely related to the movement of the study traffic.

Q. How were these facilities that were, in



your phrase, solely related to the movement of study traffic developed? How were the facilities developed?

A. As has been stated, grain and grain products moving at statutory and related rates constitutes over 40 per cent of the total freight traffic moved by Canadian Pacific in western Canada. Accordingly much of the branch line system operated by Canadian Pacific in western Canada was built to handle grain and would not have been built were it not for the handling of grain. The cost of those portions of the railway plant which would not have been built were it not for the handling of grain, less the net revenue contribution from other than grain traffic originated or terminated on such facilities, is therefore a variable cost chargeable to the movement of grain and grain products.

(Page 2557 follows)



Q. Would you go on, please?

A. Every branch line operated by Canadian Pacific in the Prairie region was examined to determine whether or not that line would have been built or maintained were it not for the handling of grain or in other words, whether or not it was solely related to the handling of grain. This was done by field studies.

Q. What do you mean by that? Was there a group of men on the ground in Western Canada to consider these things?

A. Yes, we had a group of approximately six people who went to Western Canada and worked with the local operators examining each of the branch lines.

Q. And did they go right across Western Canada doing that?

A. Well, the three Prairie provinces, and they did not get into British Columbia.

Q. Then from these field studies what happened, from the information and facts determined by them, what was done?

A. From the field studies was secured the cost of operating the branch line as well as the revenue and volume of traffic divided between grain and non-grain traffic showing the points of origin and destination. Express, l.c.l. and communications revenue was secured as well.

Q. Were tests applied to determine whether a branch line is or is not solely related to grain?



A. Three tests were applied to each branch line --

MR. FRAWLEY: Mr. Sinclair, may I ask this? Has he passed now on the proposition whether or not a branch line has been built, or has he satisfied himself if this is done that the branch line would not have been built?

MR. SINCLAIR: What he is now going to do is deal with the tests to determine whether the line was solely related to grain and he will describe the three tests and what was derived from them.

MR. FRAWLEY: He determines the proposition whether or not the line would have been built except for grain by applying tests.

MR. SINCLAIR: Well, built and maintained.

MR. MAURO: Or maintained.

MR. SINCLAIR: I think built and maintained.

MR. FRAWLEY: All I am concerned about is, is he going to develop that by these ipso facto tests?

MR. SINCLAIR: Yes. I think what is causing you difficulty is the conjunction "or".

THE WITNESS: Built and maintained; that is what I meant.

MR. SINCLAIR: I think what my friend is wondering about is how these branch lines in Western Canada are determined to be solely related to grain or not.

THE ACTING CHAIRMAN: What tests did he apply?

MR. SINCLAIR: That is what he is going to



tell the Commission now.

MR. FRAWLEY: As long as he tells us about the tests in regard to 1959 in regard to a railway that was built in 1913.

MR. SINCLAIR: Q. Deal with the first one.

A. Three tests were applied to each branch line. The first was an economic test. The non-grain revenues in total were compared with the incremental cost of the non-grain traffic on both the branch line in question and the main line as well as with branch line maintenance expenses associated with size of plant. The branch line expenses associated with size were the miles of track coefficients which were developed in the regression analysis and are set forth in Statement 404.

MR. SINCLAIR: That is Exhibit 62.

THE WITNESS: Where non-grain revenues less incremental costs exceeded the size associated costs the line would have been economic to build if grain were not handled. Where the revenue fell short of these costs --

MR. SINCLAIR: Q. Just a moment, Mr. Stenason. Do you mean at the present time?

A. Yes.

Q. That is in light of existing revenues and traffic volume by commodity?

A. And cost conditions.

Q. Would you go on, please?

A. Where the revenue fell short of these costs the line would not have been economic if grain



were not handled.

Q. Again is that in 1958 or at the present time?

A. Yes, this is in 1958, the basis of 1958 traffic revenue cost factors.

Q. Would you go on, please?

A. The results of this test were verified through application of a ratio developed by the Board of Transport Commissioners for use in branch line abandonment applications. Under this formula the ratio of 50 per cent of revenues was taken to represent the "off branch line" proportion of expenses incurred in movements of the traffic on lines other than the branch line being considered. Therefore the remaining 50 per cent of the revenue for non-grain traffic originating or terminating on the branch line was set against the variable cost of handling that traffic over the branch line.

COMMISSIONER MANN: Mr. Stenason, this test with the Board, the per cent test has been in existence for quite some time, has it not?

THE WITNESS: Yes. I have three references to the Board's 50 per cent test which is slightly different from our own.

COMMISSIONER MANN: You have not used the standard Board test?

THE WITNESS: No. There is a slight difference. The Board's test is prorated on a mile basis between the main line and the branch line and then applying 50 per cent of the main line to



represent the expenses of the main line. What we have done is to say that 50 per cent is to cover expenses on the main line and the balance is for the branch line.

MR. SINCLAIR: Q. The effect of that, the effect of using the proration that you have done -- that is the actual 50 per cent?

A. Yes. Since the bulk of the traffic in question, both originating and terminating, on branch lines is rather long-haul traffic, implements, machinery of one type or another, the effect of the procedure we have used is to provide more revenue for the branch line portion of the total movement than with the Board's basis.

THE ACTING CHAIRMAN: You are giving it the benefit of the doubt?

THE WITNESS: Yes, we are giving it the benefit of the doubt. We did it because I had this other test where we costed out the whole movement over the main line and the branch line and, using the 50 per cent basis which we did, it was checked out.

MR. SINCLAIR: Q. What was the second test that you used?

A. The second test consisted of examination by an operating officer of the branch lines found to be solely related to the movement of grain. This officer determined those of the solely related lines which were required for the movement of bridge traffic to and from other lines. The latter



branch lines were excluded from the branch lines which were found to be solely related to the movement of the study traffic.

Q. Now, with that bridge for operating reasons that would knock out the branch lines as being solely related, would that arise from movement of grain traffic as well as the movement of other than grain traffic?

A. Yes. It was done mainly on the basis of other than grain traffic, but certainly there would be some elements here arising from the movement of grain traffic. And, in addition to that, we came up with one or two solely related lines to grain which had fairly sizeable towns on them, the Prairies; we took them out as well.

Q. Now, what was the third test you applied in determining whether miles of line were solely related to grain?

A. The third test was an examination of the mix -- that is the distribution of traffic volume --

Q. Distribution of traffic volume?

A. Type of commodity.

Q. Would you expand that a little?

A. Yes -- distribution by traffic commodity, grain versus coal, other types of commodity.

Q. Yes?

A. -- of the mix of traffic volume handled over each line to ensure that the line was used primarily for the movement of the study traffic. Certain lines in which grain did not constitute the



preponderant movement of traffic were eliminated from the branch lines solely related to the study traffic.

Q. You mean the preponderance in total; all other against grain?

A. Yes. Weighted average of grain to total traffic on the set of solely related branch lines is 82.4 per cent.

Q. Grain?

A. Grain to total.

Q. Of all?

A. Grain to total.

Q. 82 --

A. .4.

Q. That is weighted traffic?

A. Yes.

Q. Now, that has to do with branch lines.

Is there trackage other than branch line trackage in Western Canada in Canadian Pacific solely related to grain?

A. Yes. In addition to the branch lines, Canadian Pacific has main line facilities in Western Canada such as sidings, yard and elevator trackage which would not have been required if the study traffic were not handled. These facilities were also examined to determine those solely related to the movement of grain and grain products.

What I have reference to here is principally terminal trackage, Vancouver and Fort William, which is used in the switching of the study traffic, and



also sidings on a number of divisions where grain constitutes 40 per cent and up to 50 per cent of the traffic moving. Operating officers of the Prairie region, in conjunction with officers attached to the study, determined which sidings would not be required if grain were not handled. There were really few sidings. The total track mileage charged here --

Q. I think it might be helpful if the total was given and the breakdown.

A. Yes. The total mileage of the sidings and the main line facilities was 235.5 miles, of which sidings constituted 107.7 miles and elevator and yard trackage constituted 127.8 miles.

Q. And the balance?

A. The balance is branch line traffic.

Q. The total figure -- well, I think on one of the exhibits we can pick off the total figure for Mr. Frawley. It is Exhibit 67, I think. It is line 15 of Exhibit 67 showing 3,132.5 miles?

A. Yes, that is correct.

THE ACTING CHAIRMAN: Mr. Sinclair, the 82.4 pretty well establishes how important grain is to the Prairies.

MR. SINCLAIR: Yes, it does.

MR. FRAWLEY: How important the rates are to the Prairies, too.

Mr. Sinclair, is there any breakdown of the 3,132-1/2 miles?



MR. SINCLAIR: We just gave you that. He gave you the two figures for sidings and elevator trackage with branch line mileage.

MR. FRAWLEY: I mean where they are.

THE WITNESS: In the material we sent your consultants was included a list of the branch lines and mileage. I can get you a copy of that.

MR. SINCLAIR: A copy is also on file with the Commission. I do not know that it is necessary to read them all unless the Commission wants to do so.

THE ACTING CHAIRMAN: No.

MR. FRAWLEY: I would just like to understand a little better to what extent we are being charged up with mainline sidings, yard and elevator trackage.

MR. SINCLAIR: You have that.

MR. FRAWLEY: But in order to determine how valid it is because this business again of "solely related", we are being asked to bear the burden of that, is that not right?

MR. SINCLAIR: Yes.

MR. FRAWLEY: Well, I think if we knew where these sidings were that were solely related to grain and --

THE WITNESS: I can give you the divisions on which they are to be found and we have in our work papers --



MR. FRAWLEY: Have you some on Calgary and Edmonton that I might be able to understand?

MR. MAURO: And between Winnipeg and Fort William.

MR. SINCLAIR: Well, while you are turning these up perhaps I can assist my friends.

MR. FRAWLEY: It is just that I do not understand it.

THE WITNESS: We have 9.5 miles in the Calgary division and 3.1 miles on the Edmonton division. We do not have the breakdown of the location in this room with us.

MR. MAURO: Can you give us the mileage between Winnipeg and Fort William?

THE WITNESS: The Kenora division is 24.6 miles and that is the only thing we have between Winnipeg and Fort William.

MR. FRAWLEY: When I say Calgary and Edmonton, I was referring to the railway that runs between Macleod and Edmonton.

MR. SINCLAIR: Well, he has the figures by division.

MR. FRAWLEY: If you could take the stations like Nanton and point out how much of that--

THE WITNESS: We do not have it in the room with us.

THE ACTING CHAIRMAN: Can you get that for Mr. Frawley?

THE WITNESS: Oh yes, very easily.

MR. SINCLAIR: Those are the sidings



pertinent to the main line tracks.

A. Or it may be an elevator track on the main line, that is a piece of track that serves an elevator exclusively.

MR. MAURO: You could perhaps let us have the Winnipeg terminal track if that is charged in here but solely allocated.

THE WITNESS: Yes, right now 12.1 miles, this is a very large terminal and that is a very small piece of the trackage.

MR. SINCLAIR: Q. And these mileages were all checked, were they not, by the railroad personnel responsible for the division?

A. Yes sir, this work was done in conjunction with the divisional superintendents of the divisions concerned who in turn consulted their engineering and other officers.

Q. If the Commission wishes to go into this further we have here both engineering and operating officers who are prepared to deal with the matter in whatever detail the Commission might wish.

THE ACTING CHAIRMAN: Thank you. I think we will just go on.

COMMISSIONER PLATT: I do not want to check all the individual points but I think I am right in my view that the main line and elevator sidings is track that goes into the elevator.

MR. SINCLAIR: That is correct. There may be some short mileages, for instance, the way the



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railway operates that because of the flow of traffic in grain trains they may have to put in the odd mile here and there for cut-out track and siding to enable grain trains to stand off.

COMMISSIONER MANN: It is my theory that --

MR. SINCLAIR:Q. But the large proportion would necessarily be what you have stated that we have the trackage right along the main line, for instance, in Saskatchewan and Alberta running to the elevator?

A. Yes, I have that breakdown here and it is 127.8 miles for the elevator and yard tracks and 107.7 for the sidings.

COMMISSIONER PLATT: Now, in your costing, are they costed the same way that regular rail line is?

THE WITNESS: They were costed by applying to the mileage a constant mile of track cost which came from the regression analysis for maintenance and also the constant mile of track investment cost and the cost of money on that which in turn came from the regression analysis. Now, we checked this very carefully with our engineering officers to make certain that the minimum cost of maintaining a yard track would be the same as the minimum cost of maintaining a branch line or a piece of running track on the basis of the concept that the cost we are dealing with is the cost necessary to keep the track in an operable condition but without the movement of any traffic over the track. It was



the view of these officers that there was no difference between yard trackage and running trackage in this regard.

MR. SINCLAIR: Q. Could I maybe clarify this a little further: Could you tell the Commission whether a test on sidings and yard trackage for one direction would be required if grain was not handled? Is that the test that was applied?

A. Yes, certainly.

Q. Would it be correct to say --?

A. To get at the number of miles, yes.

Q. Would it be correct to say that if grain was not handled then the sidings that are included in your solely related facilities would not be required on the railroad?

A. Yes, that is correct.

MR. FRAWLEY: Does that mean you allocated the whole cost to grain even though the same elevator track would be serving a coal shed right next to the elevator?

THE WITNESS: Oh, there are comparatively few of those.

MR. FRAWLEY: Well, however many there were, the total cost was put against grain?

THE WITNESS: Because in the view of our operating people these facilities would not be required if we did not move grain.

MR. SINCLAIR: Q. Mr. Stenason, you have said earlier that the variable cost of moving grain and grain products to export position in Western



Canada does not represent the cost to the railway. What else must be taken into account besides variable cost?

A. In addition to the variable cost, there is the cost which cannot be associated with the movement of any particular segment of traffic. The cost of which cannot be associated with any particular segment of traffic is termed the constant cost. Total railway costs must be recovered from total railway traffic and where the study traffic is a large segment of total traffic, obviously the most significant cost in relation to revenues is the total cost.

Q. And you say there that total railway cost may be recovered from total railway traffic under two basic reasons, is that correct? First, what? The size of the segment?

A. The size of the segment of traffic and, secondly, the question as to whether the traffic is basic to the plant. That is a question as to whether the plant has been developed largely around movement of this kind.

Q. I do not hear you.

A. And developed largely around this category of traffic.

Q. How do you determine the constant cost, Mr. Stenason?

A. The constant cost is that portion of expenses covered by allocation or regression analysis which was found not to vary with traffic



volume. In the regression analysis such cost is the difference between total cost and cost explained by the variable factors used in the regression analysis. Where expenses are covered by the allocation method, constant cost is the difference between total cost and the percentage that is variable. Direct costs are completely variable with traffic volume and, therefore, have no constant element.

MR. FRAWLEY: If the witness will go over that again. He says the constant cost is the difference between total cost and the percentage that is variable. Is that not always so? You have variable cost and constant cost and you put the two together and that makes the total cost. Is that over-simplifying it?

THE WITNESS: No, not at all, that is perfectly true.

MR. FRAWLEY: At the top of the page you say in the regression analysis such cost is the difference between total cost and cost explained by the variable factors used in the regression analysis.

A. I am really showing the same thing. Constant cost is the total cost minus the variable cost but I was trying to explain it in the terms of the two techniques that were used in getting at the variable cost.

COMMISSIONER MANN: I have one question. The division of the constant and variable is apparently dependent on whether there is a short run or long run.



Is there a time element in your criterion?

THE WITNESS: Well, there is only one time element which underlies railway variable costing or railway out-of-pocket costing as it is occasionally called and that is the long term when we use the regression analysis on a cross section of railway divisions at one point of time. We were attempting to isolate the adjustment characteristics of expenses to traffic volume over a very, very long period of time, that is a period of time long enough for all the adjustments to take place in investment depreciation, train operations and what have you. Now, probably the period of time which we are dealing with here would be certain, no longer than the allowance depreciation period, that is service life of a category of investment and in many cases it would be very short. Fuel and crew wages, for instance, things having to do with the operation of trains which can be changed very quickly.

(Page 2577 follows)



MR. FRAWLEY: Mr. Sinclair, does the witness explain at some stage why he went into this regression analysis instead of adopting the Edwards Rail Form A?

MR. SINCLAIR: He does not, but Dr. Edwards is in the court room. Either he will explain why he did not adopt the so-called Edwards Rail Form A, or this witness can explain it -- whichever you would like.

MR. FRAWLEY: Well, this is the witness who---

MR. SINCLAIR: You would like both of them to explain it, maybe?

MR. FRAWLEY: Yes, I think that would be better. We cannot get too much help in understanding this sort of stuff.

MR. SINCLAIR: Q. Well, Mr. Stenason, Mr. Frawley has asked -- and I think this is a question that might be in the minds of others as well -- why you adopted the multiple regression analysis instead of adopting the costing techniques in, as Mr. Frawley terms it, the Edwards Rail Form A?

A. Well, to answer that question one has to start with what the Edwards Rail Form A is, and what it purports to do. The Rail Form A is essentially a technique first developed for comparing costs in different regions of the United States -- rail costs. It is based for the most part on system average costs. It does not contain within it the refinements which are required in the costing of any particular category of traffic, and I am sure Dr. Edwards would agree that this was the main purpose of Rail Form A.



Q. Dr. Edwards is going to be here, and he will explain it. We will put the same question to him as we are putting to you. You say that by using multiple regression techniques you were able to introduce refinements?

A. Yes, the use of multiple regression techniques in road maintenance has made it possible to get a far more precise analysis of road maintenance costs variable with different categories of output than is possible through the use of simple regression on a cross-section of different railways where you have variations in maintenance practices as between railways.

Q. And was one of the reasons that brought this about the fact you were using Canadian Pacific in itself as a single railroad?

A. Yes, sir, that is quite correct.

Q. And was another reason -- if you do not mind my leading, Mr. Frawley -- was another reason because of the fact that you had such a large segment of traffic moving in well-defined patterns?

A. Yes, that was another reason, but your question has mainly to do with the use of multiple regression techniques, and I would like to say at this point that they are not new to railway costing. Simple regression techniques were first used by J. M. Clark in his Economics of Overhead, published in 1923, in effort to get at the variability of railway operating expenses. Simple regression has also been used by the ICC since the early thirties, and



multiple regression has been used in recent cases in the United States where a technique is required to properly get out the composition of these road maintenance accounts which is almost the ultimate in joint product or common product and cost situations.

Q. Was another reason, Mr. Stenason, the fact that electronic computers enabled the testing to be done without the laborious work that would be required if it was to be done manually?

A. Yes, that is a very important reason as to why multiple regression has not been more widely used in industry. Its use has come into prominence in only the last five or six years, when good electronic equipment has been available.

THE ACTING CHAIRMAN: I think that covers it.

MR. SINCLAIR: Q. Did you charge a portion of the passenger train deficit to grain, Mr. Stenason?

A. No, the railway's position is that the problem of matching revenue with the variable expense of operating passenger trains is a managerial one. Passenger traffic is incremental traffic. Therefore, the passenger deficit has not been taken into account in considering the total cost of moving the study traffic.

MR. FRAWLEY: I wonder if that phrase could be expanded upon a little bit -- "matching revenue with the variable expense of operating passenger trains is a managerial one". I wonder if Mr.



Stenason would say a little more about that, because everything is managerial, after all.

THE WITNESS: Well, grain is not ---

MR. SINCLAIR: Unfortunately it is not, Mr. Frawley.

Q. Leaving that aside, just what do you mean by "matching revenue" in that phrase? What do you mean by that phrase "matching revenue with the variable expense of operating passenger trains is a managerial one"?

A. Taking whatever steps are necessary on both the revenue side and the cost side of the movement of passenger traffic to bring the two into balance.

MR. FRAWLEY: Is not this managerial -- what is happening here? That is perhaps getting ---

MR. SINCLAIR: Surely, the obvious answer to that is No, because it is a rate that is fixed by statute. That is obviously not a managerial rate when it is fixed by statute.

MR. FRAWLEY: We are not going to play around all afternoon with the meaning of the expression "managerial". Mr. Crump is the manager and I would have thought he has a lot to do with what we are spending our time on today.

MR. SINCLAIR: He certainly cannot change the grain rates, Mr. Chairman and members of the Commission.

MR. FRAWLEY: You are going to change it, if you have your way.

MR. SINCLAIR: Not changing the rate to the



farmer, Mr. Frawley. Is there any further development of this part of the evidence that you wish, Mr. Chairman?

THE ACTING CHAIRMAN: No, I think not, Mr. Sinclair.

MR. SINCLAIR: Q. How did you determine, Mr. Stenason, the amount of constant cost to be charged to the grain traffic?

A. In the study, the constant cost was apportioned between grain and all other freight traffic on the basis of the variable cost of grain to the total variable cost of all freight traffic on the system.

MR. SINCLAIR: Now, Mr. Chairman and members of the Commission, Mr. Stenason has explained the method used and the application of the method in the study, and I would now like to discuss with him the results of that method and application to arrive at the numbers of dollars in various categories of accounts, and in total.

MR. FRAWLEY: Mr. Chairman, may I make a very short statement before my friend proceeds. I am not unconcious of the fact that I am not at all prepared to undertake any cross-examination, but before we leave the matter of passenger traffic I merely suggest to the Commission that at this point the witness should deal a little more completely with that. He says that the passenger deficit has not been taken into account in considering the total cost of moving the study traffic. Well, what did he



do with the passenger deficit. Where did he put it, and against what traffic did it go? I think, with respect, something more might be said about that before he leaves it rather than leaving all that to a time weeks and weeks from now when we might have to ask ---

THE ACTING CHAIRMAN: Mr. Stenason, did you take into consideration passenger traffic at all?

THE WITNESS: Well, yes, in the course of the cost analysis, for example, on road maintenance expenses variables were introduced into the regression analysis for passenger traffic as well as freight traffic.

THE ACTING CHAIRMAN: Did you treat it as being a deficit or a surplus?

THE WITNESS: Well, I have not treated it in any particular way, sir. The results in many sections of cost analysis in the passenger traffic ---

THE ACTING CHAIRMAN: I mean in your study did you go into the question at all of passenger deficit as such?

THE WITNESS: No, I have not as yet.

MR. MAURO: Perhaps I could just point to the thing that Mr. Frawley and I are particularly interested in, Mr. Chairman. It is, for example, the relationship and allocation of constant costs, the allocation of variables on main line trackage, and the deductions of that portion that might be allocated to passenger services. While I understand that my learned friend's approach to this case has been specifically related to a grain study, and



while I do not agree with him -- his approach to it is understandable -- we will need for our study to see what was actually done with the passenger traffic or the passenger deficits, because it is not just sufficient to say that they are not in this study. How were those portions of costs which could be, and could most naturally be, allocated to passenger service dealt with?

MR. SINCLAIR: Maybe I can ask one question here to clear this up.

Q. Mr. Stenason, in costing this grain and in the direct regression or allocation methods were passenger factors excluded in arriving at cost?

A. Yes, they were

Q. Completely?

A. Yes, sir.

MR. FRAWLEY: Now, of course, if I might -- I do not want to prolong this, but I would like to add something to what my friend Mr. Mauro said, and in order to be specific I will use an illustration. I had something to do with a Rail Form A study that was made on the movement of coal from Alberta to Ontario in 1952, and I recollect very clearly -- I have a copy of the study, but it is not with me at the moment -- that under the heading of "constant cost", after they left the out-of-pocket costs and went on to arriving at the total all-inclusive cost, there was an item there "allocation of passenger deficits", and it was pretty large. It was about \$2 a ton on moving our coal from Alberta to Ontario.



Now, Mr. Sinclair assures me that the grain has not been charged with that, and we accept that, of course, but I am concerned with what happened to it. In the Edwards Rail Form A it was part of the routine to put down a portion using gross ton miles, or some other method of the passenger deficit. That has not been done in this case, and we do not complain. We are not looking for more costs to be put onto the grain, but we are curious to know what does happen to it.

THE ACTING CHAIRMAN: As I understand this witness, he has not had regard to the passenger deficit in any way in his costing.

THE WITNESS: No, sir, the passenger expenses are put aside. They are excluded completely.

MR. SINCLAIR: Mr. Frawley is quite right when he says that under the procedures he is accustomed to he has found a proportion of the passenger deficit allocated to the segment of the freight traffic under review. In the instant case that was not done. I made that clear in opening. The witness has now made it abundantly clear that that was excluded. Now, Mr. Frawley wants to know, I take it from his question, how that amount is going to be taken care of, and if it is to be put onto the grain, or where it is to be put. Is that your question?

MR. FRAWLEY: Yes. I am reminded ---

MR. SINCLAIR: Well, I think this is not the witness of whom to ask that question.

MR. FRAWLEY: Well, is the livestock



carrying it, or the agricultural machinery?

THE ACTING CHAIRMAN: Mr. Frawley, as I understand this witness, he just is not able to answer your question.

MR. MAURO: I just want ---

MR. SINCLAIR: I do not know whether this is cross-examination or not. I am glad to have it going on, I might say. This is a major point, as they say, although ---

MR. MAURO: Well, can I ---

MR. SINCLAIR: Will you wait until I finish, and then you can cross-examine on that.

THE ACTING CHAIRMAN: Mr. Sinclair, there will be a witness of yours to whom that question can be put?

MR. SINCLAIR: Well, Mr. Chairman, if it is germane to the determination of the question, and the Commission so rules, then, of course, that is so, but if, as my friends say, they may have witnesses who will be dealing with this substantively, and one of the questions -- I might as well give my friends notice now that one of the questions I will put to their experts is: Would they in following their past practices as costing men take a portion of the passenger train deficit and assign it to grain? That is one of the questions I will put. And, secondly, I will ask if it is excluded do they think it should be excluded, and various questions of that nature. I will ask those questions of their experts when they come forward.



THE ACTING CHAIRMAN: Apart from indicating your line of cross-examination there is -- we might as well be realistic about this -- there is a passenger deficit, and, consequently, the Commission will be interested in that, and if this is not the proper witness then there will be a witness from whom the information can be obtained by ourselves, if not by Mr. Frawley and Mr. Mauro?

MR. SINCLAIR: That is right, sir.

THE ACTING CHAIRMAN: Will that be Mr. Crump?

MR. SINCLAIR: No, sir. We plan at the appropriate time to call a witness to deal with what has been done in the passenger field by the railways -- by Canadian Pacific -- and various matters arising out of that, and then we will put in the figures that we have.

THE ACTING CHAIRMAN: Part of this afternoon's examination of Mr. Stenason indicates that he, as a witness, is not qualified to answer the question that we are confronted with because he has not given consideration to it in his costing.

MR. SINCLAIR: He has excluded it from his costing of grain.

MR. MAURO: What about the passenger phase of constant cost?

MR. SINCLAIR: If my friend wants to ask the witness about that then it is all right.

MR. MAURO: I am giving you notice now.

MR. FRAWLEY: Mr. Sinclair says he is going to ask our witnesses if they allocated a portion



of the passenger deficit to the cost of grain. I might be excused if I ask Mr. Sinclair to tell us what that passenger deficit is, and then our witnesses might be able to use that information. I do not know whether they are able to do anything until you disgorge yourself of a lot of information.

MR. SINCLAIR: Well, it can be used hypothetically.

THE ACTING CHAIRMAN: You have Mr. Stenason in the box, and my understanding is that he is not in a position to give any sort of answer to the question that has been raised. That being so I think we had better go on to something else, but, Mr. Sinclair, the question is not dead; it will be raised later.

MR. SINCLAIR: That is right, and each side has given the other side notice of the question.

THE ACTING CHAIRMAN: Yes, and the Commission has given notice too.

---Short recess.

(Page 2589 follows)



THE ACTING CHAIRMAN: All right, Mr. Sinclair.

MR. SINCLAIR: Q. Mr. Stenason, just before the break I was going to ask you to discuss with the Commission the application in dollar accounts by various accounts through applying the methods you have described to the Commission. Now, these are set out, Mr. Chairman and members of the Commission, in some detail in Exhibit 63 through Exhibit 70; it is Exhibit 63, 64, 65, 66, 67, 68, 69 and 70.

Now, looking first at Exhibit 63.

A. Exhibit 63 shows the variable portion of Road Maintenance expense applicable to the study traffic in the amount of \$3,601,000.

Q. You have rounded it out from the figure of \$3,600,079, as shown in line 31 of Exhibit 63?

A. Yes, I have rounded it out.

Column 1 shows the primary account number. Column 2 shows the name given to the grouping of the primary accounts. Column 3 shows the name of the independent variable.

Q. So that it may be of assistance to some, the dependent variable is contrary to the independent variable; the dependent variable would be what, the total of the expense and the accounts.

A. The total of the expense as shown in the accounts.

Q. As listed in column 1?

A. Yes. This was described in Exhibit 62



and it is a figure which emerged from the records, and this is in the case of road maintenance.

However, in the case of Accounts 275-8-9 Insurance and Joint Facilities, the figure shown in this column is the ratio of the total of these accounts to the total of road maintenance accounts excluding these accounts. Column 5 is a factor developed separately for each group of accounts listed and is the ratio of system expense to the total of division expense. This was done as described previously so that the appropriate district, regional and system expenses are included in the variable costs. Column 6 is Column 4 times Column 5. Column 7 shows the development of a further factor so that costs of superintendence for road maintenance may be distributed to the other road maintenance accounts. In the regression analysis we limited the overheads -- the direct maintenance expense including the overheads, and we arrived at a figure of .05723 per dollar of road maintenance expenditure. Secondly, we multiplied the unadjusted dollars of road maintenance expenditure by this amount in order to get the applicable portion of superintendence for each group of accounts.

MR. FRAWLEY: Do I understand that all of these complicated calculations were made because he couldn't do it by applying I.C.C. rail form A?

THE WITNESS: No, I wouldn't want to do it by applying that.

MR. SINCLAIR: Q. Because, as you stated



previously, by doing this you were able to secure a more precise and accurate determination of cost, is that correct?

A. Yes. Rail form A led us into far too much by way of averaging procedure, and so forth.

MR. FRAWLEY: It would be a lot easier to understand.

MR. SINCLAIR: I wonder possibly if Mr. Frawley would like to have the cost determined by rail form A?

MR. FRAWLEY: You asked me that once before, and as soon as you asked me that I knew it wasn't good for me.

MR. SINCLAIR: Q. The answer, I take it, to that question is "No".

THE ACTING CHAIRMAN: Greeks bearing gifts.

MR. SINCLAIR: Q. Can you proceed, Mr. Stenason, with Exhibit 63?

A. Column 8 is the final coefficient for each group of road maintenance expense. Column 9 contains output units for the study traffic adjusted for non-revenue freight. Column 10 is the amount chargeable to the study traffic, which is Column 8 times Column 9.

Now, I would like to turn to Exhibit 64.

Q. That shows the variable portion of equipment maintenance. You have dealt with road maintenance in 63, and now this is equipment maintenance in Exhibit 64.

A. Exhibit 64 shows the variable portion



of equipment maintenance applicable to the study traffic in the amount of \$11,423,000. Column 1 shows the primary account number.

Q. Again the dollar accounts would be your dependent variable?

A. Yes, that is right.

Column 2 shows the name given to the groupings of primary accounts. Column 3 shows the name of the independent variable and Column 4, the unadjusted coefficient of variable cost. Column 5 is the adjustment factor applicable to equipment maintenance supervision to reflect system expenses not included in the analysis. Column 6 is Column 4 times Column 5. Column 7 contains output units of the study traffic. Column 8 shows the amount chargeable to the study traffic for each group of accounts which is attained by multiplying the adjusted coefficient or unit cost by output units for the study traffic.

MR. FRAWLEY: Has Mr. Stenason explained that expression "output units"?

MR. SINCLAIR: I think he did earlier, but we can do it again.

Q. You used it as a synonym, but would you do it as a synonym to your independent variables?

A. The output unit is a measure of the volume of work done on the railway, such things as gross ton miles, empty car miles, loaded car miles; they are all output units reflecting the work done.



Q. Switching?

A. Switching.

THE ACTING CHAIRMAN: Are these the 1958 figures you are working on here?

THE WITNESS: On equipment, sir. The only three-year figure is on the superintendence and overhead, and the others -- no, it is just superintendence and the overhead; the others are all 1958.

THE ACTING CHAIRMAN: And on the basis of the cost?

THE WITNESS: Yes sir.

MR. SINCLAIR: Q. It was only in the regression analysis where you took the aggregate of the three years?

A. Yes. I explained earlier that we did that so as to avoid the problems from the operation of year to year, and this direct expense gives very little difficulty from one year to the other.

Q. What proportion of expenses in maintenance of the equipment are variable with traffic; what is the variability factor?

A. Maintenance of Equipment Expense is 100 per cent variable except for the expense in the accounts supervision and overhead and account work equipment. Statement 406, Exhibit 64, shows an amount of \$727,000 chargeable to the study traffic for equipment maintenance - superintendence and overhead. The unit cost for this group of accounts was developed from regression analysis. The independent variable was the dollars of direct



equipment maintenance excluding depreciation.

The variability of other categories of equipment maintenance was examined in terms of their behaviour and the characteristics of the expense account. Variability of these expenses is as follows:

1. Freight car repair expenses are completely variable with use and time;
2. Steam locomotive repair expenses are completely variable with steam locomotive miles;
3. Diesel locomotive repair expenses, treated separately for road and yard, are completely variable with diesel locomotive miles road and yard.

Using 100 per cent variability, the analysis was then based upon the dollars in the accounts concerned in 1958 adjusted to wage and price levels existing at December 31, 1958.

Q. What about locomotive maintenance costs, Mr. Stenason?

A. Locomotive maintenance was treated separately for yard and road engines. Total cost in 1958 of maintaining road and yard locomotives was divided by locomotive miles and the cost per locomotive mile so derived was multiplied by the road and yard locomotive miles involved in movement of grain and grain products in 1958. This was done for diesel and steam separately. A



proportion (83 per cent for road and 95 per cent for yard) reflecting the per cent of diesel to total locomotive miles in the Prairie and Pacific Regions in 1958 was arrived at in order to weight out the use of diesels versus steam locomotives in both road and yard operations. The total yard and road locomotive miles applicable to the study traffic, adjusted by this factor, was multiplied by the cost per yard and road locomotive mile. Exhibit 64 shows the cost for road locomotive repairs of the study traffic to be \$1,827,000 and yard locomotive repairs to be \$176,000

Q. That is shown on lines 12 and 14 of Exhibit 64?

A. Yes, that is right.

Q. Now, what about depreciation?

A. Road locomotive depreciation as shown on Statement 406 was \$815,000 and for yard locomotives \$111,000. The costs per locomotive mile were arrived at by applying the straight line depreciation rates approved by the Board of Transport Commissioners.

Q. Yesterday we heard Mr. Bandeen talk about a different service life for road diesels and for yard diesels; were they taken into account by you?

A. In 1958 -- and this study pertains to the year 1958 -- Canadian Pacific used the same service for both road and yard diesel locomotives.

Q. That is, 25 years?



A. Yes, 25 years.

Q. And if you had used the 20-year for road and 25-year for yard, would your costs have been higher?

A. Yes. I would have increased the yard diesel and locomotive costs if you had used the higher service life.

Q. The road?

A. I am sorry, the road.

Q. There was one other factor, Mr. Stenason, and that is that I think it might be of assistance to point up here that Canadian Pacific in their costing took the actual diesel and steam complex as it existed on Canadian Pacific in 1958, rather than doing a study of complete dieselization?

A. That is right.

Q. I think that is one of the questions that was raised by the American experts of my friend, and if the Commission wishes we can go into that now or we can leave it for my friends.

THE ACTING CHAIRMAN: Well, perhaps you had better.

MR. SINCLAIR: Q. Mr. Stenason, if you used complete dieselization or a bigger factor of dieselization for expense in 1959, would you have to make any adjustments, for example, for wages, different than 1958?

A. Yes, we would have to take into account non-wage increases subsequent to the end of 1958.



Q. And they are higher than they are in your study?

A. Oh yes. Consequently, there is your cost in many of the agreements with regard to these employees, and that was settled in 1959.

Q. They give, under their contracts through 1959, a step-up increase over 1958?

A. That is right.

Q. And complete dieselization would also take into account changes in material prices?

A. Yes, and changes in the income tax rate in so far as costs of money are concerned.

Q. And changes in the sales tax?

A. Yes.

Q. And higher unemployment insurance contributions?

A. Yes.

Q. And would it affect the maintenance cycle of diesels based on their age?

A. Yes.

Q. Mr. Bandeen explained yesterday that -- I don't think we need to go into it thoroughly again, he did it yesterday -- that if you did this you would have to increase your costs for maintenance, you would do this because of cycling of diesels through their maintenance cycle?

A. Yes, ~~the average age~~ of the diesel fleet of the Canadian Pacific is very small, the fleet is relatively new, and we would have to make an allowance for the increase in steam locomotive



repair expense which would be expected to come, which would represent a more normal level of diesel locomotive repairs. In the study we have taken the actual 1958 diesel expenses, but if we went over to an assumption of complete dieselization we would have to reflect the entire costs of diesel locomotives under conditions of complete dieselization.

Q. Can you advise the Commission as to the level of steam locomotive repair costs and those studied by virtue of the fact of the transition over into diesel?

A. The steam locomotive repair expenses were taken for the year 1958; that was the year in which Canadian Pacific made almost no major repairs to steam locomotives, scrapping steam locomotives as they required a major repair and, consequently, the expenses shown in the accounts are largely for running repairs to steam locomotives and they are very low indeed for the locomotive miles, both in terms of past experience and also relative to the diesel costs.



Q. Now, dealing with freight train repair costs, and that is on Exhibit 64, at line 16, would you speak to that, please?

A. Freight car repair expenses were allocated in the ratio of 70 per cent to car-miles and 30 per cent to car-days. It was substantiated through both Interstate Commerce Commission studies and tested by mechanical officers of Canadian Pacific that 30 per cent of the cost of maintaining a freight car would vary with the passage of time and would include such elements as rust, air-brake cleaning, painting roof, sides and doors, while 70 per cent of the cost of maintaining freight cars, that is, brake shoes, wheels, draft gear and floors, vary with car-miles; that is, with the use of the freight car. A deduction was made from the total cost of freight car repairs to reflect the repair portion of the net credit in Hire of Freight Cars. This represents the repair cost of miles run by Canadian Pacific cars on foreign lines.

I would like to point out that Canadian Pacific is one of the railroads which receives income from the rental of freight cars. There are more Canadian Pacific cars off the Canadian Pacific line than there are other cars on the Canadian Pacific line.

Q. Did you give credit for that?

A. Yes. Freight car repairs were reduced in the Hire of Freight Cars.

An adjustment was made in freight car repair expenses to reflect the different maintenance



expenses of box cars as compared with other types of freight equipment. Car-miles for all freight traffic are available from the records of the Company. Active car-days for all freight traffic were developed through special study. Exhibit 64 shows the cost of freight car repairs of \$5,211,000 for the study traffic.

Q. That is line 18 of Exhibit 64?

A. Yes.

Q. We will deal with depreciation of the freight train cars as shown on Exhibit 64.

A. Exhibit 64 shows the cost of depreciation of freight cars of the study traffic of \$2,491,000. Freight car depreciation varies 45 per cent with car-miles and 55 per cent with car-days. These figures are substantiated through both Interstate Commerce Commission studies and tested by mechanical officers of Canadian Pacific. The account for freight car depreciation is based on the depreciation rates approved by the Board of Transport Commissioners. The account was also adjusted for Hire of Freight Cars as in the case of freight car repairs.

Q. Now, lastly, work equipment?

A. Work equipment repairs were tested by time-series analyses and found to be 76.5 per cent variable with the total Road Maintenance expenses. Exhibit 64 shows the cost using this variability for the study traffic at \$47,000. Work equipment depreciation was developed similarly



and resulted in a cost of \$18,000 chargeable to the study traffic.

Q. If the Commission has no questions on Exhibit 64, we will turn to Exhibit 65, which shows the variable portion of transportation expenses applicable to the movement of grain and grain products to export positions in western Canada.

A. Exhibit 65 shows the variable portion of transportation expenses applicable to the study traffic in the amount of \$13,419,000.

Q. Again, a rounding out of the figure that is shown on line 32 of Exhibit 65?

A. Yes, that is correct.

Q. Would you go on, please?

A. Column 1 shows the primary account number and Column 2, the name given to the groupings of primary accounts. Column 3 shows the independent variable ---

Q. This again could be translated output units?

A. Yes.-- except for train fuel, crew wages, grain doors and loss and damage -- freight which were charged direct.

The records of Canadian Pacific show the cost of fuel and crew wages for each train-run, as well as the net ton-miles and gross ton-miles handled. An equation factor was applied to adjust for the resistance of heavier loading commodities such as grain in the basic statistics. The cost of fuel and crew wages attributable to the study



traffic was computed on the basis of gross ton-miles of the study traffic, adjusted, to gross ton-miles of all traffic on each train-run. The cost of grain doors and loss and damage claims of the study traffic was directly available from the Company's records.

Q. Are they substantial items, Mr. Stenason?

A. Yes, they are. They are shown under 402, Account 402, line 26 of Exhibit 65. Grain doors are shown as \$768,805, and loss and damage-freight, the last figure appearing in the column, is \$307,487. So they are about a million dollars between the two.

Q. In your cost study did you charge moving the grain doors back to the loading point?

A. That would be part of the non-productive cost.

Q. That would move under OCS which you took under an overall ratio?

A. Yes.

Q. I think you said earlier that you used the overall ratio even though OCS would not load as heavily?

A. That is correct.

Q. Would you go on, please?

A. Columns 5 and 6 are used to adjust for the difference between System and Division expense. Column 5 is the adjustment factor used to bring the Division expense up to the System basis so that appropriate District, Regional and System expenses are included in the variable cost. Column 6 is Column 4



times Column 5. Column 7 is Column 4 times \$0.04390, the variable supervisory cost in relation to direct expense.

Q. That is the figure that is shown under Column 6, line 1?

A. Yes, that is right, which is the variable supervisory cost in relation to direct expenses.

This is done so that the costs of superintendence for transportation may be distributed to the other transportation accounts. Column 8 is the sum of Column 6 and Column 7 and reflects the final coefficient for each group of transportation expense. Column 9 contains output units for the study traffic and when multiplied by the appropriate amounts in Column 8, provides variable expense chargeable to the study traffic. Direct expenses have been entered in Column 10 in the case of train fuel, crew wages, loss and damage -- freight and grain doors.

Q. We will turn to the next exhibit, which is Exhibit 66. Would you comment on that, please?

A. Exhibit 66 shows the cost of money for investment in Road Property of \$4,454,000 and in Equipment \$7,448,000 chargeable to the study traffic, totalling \$11,902,000.

MR. FRAWLEY: Where is the text? Is there some text on this, Mr. Sinclair?

MR. SINCLAIR: Yes, page 27, Exhibit 66.

Q. Would you go ahead, please?

A. Column 1 shows the categories into



into which the investment has been divided; Column 2 shows the independent variable or the output unit used to measure variation in each investment category; Column 3 shows the unit variable cost which attaches to each of these output measures. This cost results from multiplying the variable net investment per output unit for each category by the net cost of money at $6\frac{1}{2}$ per cent.

MR. FRAWLEY: This is the time that I suppose I should put on record, and we won't develop it now, that this evidence is -- I suppose if I were in the United States I would say incompetent, irrelevant and immaterial, but we will just say that it is not proper to place before the Commission in view of what I regard as the state of law in Canada today, which states that the Canadian Pacific Railway is not allowed to earn any more than $3\frac{1}{2}$ per cent on its property investment account. My friends disagree with that and continue to disagree, but unless the Commission is going to open it all up and, on its own, fix a larger amount -- until that is done, then in my respectful submission we cannot, and certainly should not, depart from the limits placed upon the Canadian Pacific's permissible level of earnings by the Board of Transport Commissioners. In my respectful submission, we have this ridiculous result, that grain would earn $6\frac{1}{2}$ per cent and live-stock would earn $3\frac{1}{2}$ per cent or farm machinery would earn $3\frac{1}{2}$ per cent. That, merely to state it, is enough to condemn it.



THE ACTING CHAIRMAN: Well, Mr. Frawley, you have made your objection. So far as Mr. Sinclair is concerned and these witnesses, he is authorized and entitled to make his own case. If he wants to urge a higher rate of interest, that is all right, he can urge it, but we can't interfere with him.

MR. SINCLAIR: My position is that the cost of money is a fact, the cost of capital is a fact, and I, through the witnesses, am proving the facts, and I am expecting the Commission to deal with them in due course.

THE ACTING CHAIRMAN: I imagine that will be argued later.

MR. SINCLAIR: I would think so.

MR. FRAWLEY: And my friend knew about it when he wrote it.

MR. SINCLAIR: He is quite right that it is too low under existing circumstances. A good case can be made for it being higher.

MR. FRAWLEY: It is a lot higher than $3\frac{1}{2}$ per cent.

MR. SINCLAIR: Q. Would you go on, Mr. Stenason, with Exhibit 66?

A. Column 4 shows output units for the study traffic; Column 3 times Column 4 shows the amount of expense in each investment category chargeable to the study traffic, with the result appearing in Column 5. Column 6 shows the totals for the cost of money on investment in road property equipment chargeable to the study traffic.



Exhibit 6720 711

Q. Yes, unless there is any further question arising from Exhibit 66. Exhibit 67.

A. Exhibit 67 shows the method of developing the cost of facilities solely related to the study traffic. Section A shows the method of arriving at the cost of Road Maintenance, including depreciation, of lines solely related to the study traffic, which is \$1404.37 per mile of track. Column 1 shows the account number and Column 2 the group of accounts. Column 3 shows the coefficient appearing in Statement 404, which is Exhibit 62, with size of plant. Column 4 is the adjustment used to include expenses at the System level which are not included at the Division level, as well as a portion of joint facility expense and insurance. Column 5 shows the adjusted coefficient which was obtained by multiplying Column 3 by Column 4. To this was added Superintendence of Road Maintenance at \$0.05723 per dollar of direct Road Maintenance Expense.

(Page 2612 follows)



Q. Giving a total?

A. Giving a total of --

Q. I am sorry, giving a total for road maintenance per mile of track including the various factors you have dealt with.

A. Including the investment?

Q. Yes.

A. Of \$2,408.41.

Q. But excluding investment, \$1,404.37.

A. Yes.

Q. Now, dealing with road maintenance per mile of track maybe you could deal with section B of Exhibit 67 which is investment in road property.

A. Section B of Exhibit 67 shows the method of arriving at the investment expense variable associated with facilities solely related to the study traffic. Gross and net investment per mile of track are set forth. To the net investment is applied the net cost of money at 6-1/2 per cent. The investment cost per mile of track is \$1,004.04 for investment.

THE ACTING CHAIRMAN: Which would be subject to Mr. Frawley's objection.

MR. SINCLAIR: Mr. Chairman, something occurs to me when I hear Mr. Frawley talking about 3-1/2 per cent being the cost of money and I thought it rather significant that even Mr. Fleming with all the powers at his command cannot get money for that.

MR. FRAWLEY: I am only talking about what



the Board of Transport Commissioners feel the economy of Canada can stand.

THE ACTING CHAIRMAN: I am sure we will hear all this in argument later.

MR. SINCLAIR: Let us take it that every time the cost of money is used, Mr. Frawley puts up in an objection, I disagree with his objection.

THE ACTING CHAIRMAN: In that way I think we will save some money on the record.

MR. SINCLAIR: Q. Would you go on then, Mr. Stenason?

A. The road maintenance and investment costs are each multiplied by the 3132.5 miles of track solely related to the study traffic, to produce road maintenance and investment costs associated with track solely related to the study traffic of \$7,544,000.

The cost of facilities solely related to the movement of grain chargeable to the study traffic was adjusted to reflect the branch line portion of net railway operating revenues realized from non-grain traffic originating and terminating on the branch lines. That is to say, since we were charging the constant cost of these lines to grain we adjusted downwards the constant cost or the contribution made from non-grain traffic.

Q. You gave the credit to that account, did you?

A. Yes.

Q. And is it correct that that was a



matter that the American experts raised with you?

A. Yes, that is correct.

Q. And you showed them in your precis that you had given them the full credit for the non-grain revenue?

A. Yes. Once again this was one of Mr. MacKimmie's experts.

Q. Would you go on, please?

A. The credit adjustment to road maintenance costs amounted to \$682,000, and to investment costs \$488,000, or a total of \$1,170,000. These adjustments are shown on Exhibit 67. After deducting the credit from the cost of the facilities solely related to the study traffic, the balance is \$6,374,000 which is the total net cost for facilities solely related to the study traffic.

Q. Now, would you turn to Exhibit 68.

A. Exhibit 68 shows the allocation of expenses for traffic and general, communications-rail, rents and taxes (other than income taxes) to the study traffic. The amounts so allocated are \$4,080,000 for traffic and general, \$645,000 for communications-rail and \$926,000 for rents and taxes (other than income taxes). These amounts were obtained by taking the percentage relationship that the total expenses in the aforementioned accounts were to the balance of total operating expenses, excluding those attributable to passenger service, and applying the percentage relationship to the variable cost in each category of expense



chargeable to the study traffic.

Q. Exhibit 69 and 70 deal with the development of constant costs as related to the study traffic. Would you speak to those, please? First take Exhibit 69.

A. Exhibit 69 shows the development of the constant cost of the system as a whole. Columns 1 and 2 show the number and name given to the groupings for each account. Column 3 shows the constant cost. This was developed from the regression analysis in the case of those accounts analyzed by regression methods, and total expense in each account treated as constant.

Removing snow, ice and sand entered into the picture here.

MR. MAURO: On Exhibit 68, can we expect to receive the breakdown on rents and taxes, that item that is chargeable to the study traffic?

THE WITNESS: I think your experts already have that but if they have not I will make it available to you.

MR. SINCLAIR: Q. Would you go on, please Mr. Stenason and deal with Exhibit 69?

A. Yes.

Column 4 is the adjustment factor used to include expenses at the system level which are not included at the division level, as well as joint facilities and insurance expense. Column 5 shows the adjusted constant and is obtained by multiplying Column 3 by Column 4. Column 6 distributes a portion



of superintendence to each of the appropriate accounts. This was applied to all accounts except equipment depreciation and investment. Column 7 shows the total constant cost of the system. An allowance was made to reflect traffic and general, communications-rail, and rents and taxes (other than income taxes). The amount of system constant cost chargeable to the study traffic was arrived at by applying to the total constant cost shown in Column 7 the per cent that the variable expense of the study traffic, after deducting costs of solely related facilities chargeable to the study traffic, bears to total variable expense for all freight traffic. The system constant cost chargeable to the study traffic amounts to \$9,813,000.

Q. That is a round-out of the figure shown on line 25 of Exhibit 69?

A. Yes.

Q. Would you turn now to Exhibit 70 and comment on that?

A. Exhibit 70 shows the constant cost portion of size related costs amounting to \$8,547,000. Columns 1 and 2 show the account numbers and name given to the groupings of primary accounts. Column 3 shows the cost per mile of track. Column 4 shows the adjustment factor used to include expenses at the system level which are not included at the division level, as well as joint facility and insurance expense. Column 5 is the adjusted cost per mile of track. To the adjusted variable cost



was added its portion of Superintendence. There was also added an amount to reflect expenses for traffic and general, communications-rail, joint facility rents and taxes. In addition, there was added the investment cost in road property per mile of track. This resulted in a total cost per mile of track of \$2,650. The miles of track on the system, after deducting the miles of track of solely related facilities, was 21,070, resulting in a total cost associated with size of plant of \$55,838,000. This was prorated to the study traffic in the relation that the variable expense of the study traffic, after deducting costs of solely related facilities chargeable to the study traffic, bears to total variable expense for all freight traffic.

Q. Then, you have prepared a table which summarizes the results that you have described above and which are set out in detail showing the calculations in this last group of exhibits, Exhibit 63 through 70 that you have been discussing?

A. Yes.

Q. That can be put into the record.

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TORONTO, ONTARIO

Stenason, dir.
(Sinclair)

2618

Variable Cost

Road Maintenance			
Road way Maintenance			
(St.405)		\$3,601,000	
Road Maintenance			
Portion of solely			
related facilities	\$4,399,000		
Less credit non-			
grain traffic			
(St.409)	682,000	3,717,000	\$7,318,000
Equipment Main-			
tenance (St.406)			11,423,000
Transportation			
(St.407)			13,419,000
Communications -			
Rail (St.410)			645,000
Traffic and General			
(St.410)			4,080,000
Joint Facility			
Rents, Taxes			
(other than In-			
come Taxes) and			
interest			
Joint Facility			
Rents, and Taxes			
(St.410)		926,000	
Interest			
Road Property			
(St.408)	4,454,000		
Equipment			
(St.408)	7,448,000		
Solely Related			
Facilities	3,145,000		
Less credit non-			
grain traffic			
(St.409)	488,000	14,559,000	15,485,000
			\$52,370,000

Total Cost

Constant-System (St.411)	9,813,000		
Constant-Size Related (ST.412)	8,547,000	18,360,000	
			\$70,730,000



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(Sinclair)

2619

MR. SINCLAIR: Now, Mr. Stenason, please answer my friends.

MR. FRAWLEY: Not now, a little later.

THE ACTING CHAIRMAN: That will be reserved and you will be called on later, Mr. Stenason. Thank you very much for your very clear evidence. I am sure we on the Commission would very much dislike having to do all the work that you had in preparing this evidence for us. Thank you very much.

MR. SINCLAIR: I think I should say, Mr. Chairman, in light of your ruling that the next witness for the railways is Dr. Ford K. Edwards.

THE ACTING CHAIRMAN: Very well, we will adjourn now until 10.00 o'clock tomorrow morning when we will hear Dr. Edwards.

---Whereupon the hearing adjourned at 4.00 o'clock to resume at 10.00 a.m., Wednesday, December 16, 1959.

Mr. McLaughlin

ROYAL COMMISSION

ON

TRANSPORTATION

HEARINGS

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INDEX TO EVIDENCE
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	<u>Page No.</u>
RULINGS	2621
RESIGNATION OF CHAIRMAN	2693

EDWARDS, Ford K.

Direct Examination

By Mr. Sinclair 2636 - 2769

<u>EXHIBIT NO.</u>	<u>DESCRIPTION</u>	
71	Statute of the Province of Manitoba: An Act confirming a certain agreement respecting certain railways, freight and passenger rates, and a copy of said agreement dated 11th February, 1901. (Schedule A)	2633
72	Document entitled "Transcript - pp.1866-1867, Volume 14, Dec.9th 1959.	2633
73	Photostatic copy of tripartite agreement of 30th July, 1897, (Schedule A attached)	2634
74	Photostat of agreement between Heinze, Angus & Shaughnessy, dated 11th February, 1898. (Schedules A, B, C and D attached)	2635
74A	Photostat of promissory note dated December 3rd, 1898.	2635



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ROYAL COMMISSION ON TRANSPORTATION

Proceedings of hearings held in
the Court Room, Board of Transport
Commissioners Offices, Ottawa,
Ontario, on the 16th day of December,
1959

COMMISSION

Mr. M. A. MacPherson, Q.C.	Acting Chairman
Mr. H. Anscomb	Member
Mr. A. H. Balch	Member
Mr. H. Mann	Member
Mr. A. Platt	Member

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Mr. G. S. Cumming
Mr. H. W. Ellicott - Adviser

Mr. F. W. Anderson	Secretary
Major N. Lafrance	Assistant Secretary

In the absence of The Honourable Mr.
C. P. McTague, Q.C., Mr. M. A.
MacPherson, Q.C. presided.

Commissioner R. Gobeil was also absent.



ROYAL COMMISSION ON TRANSPORTATION

VOLUME 19 - DECEMBER 16, 1959.

WITNESS'S REVISIONS

Page 2648-2nd full paragraph, line 3:

Reads - Canadian Pacific totalled 13.6
billion ton-miles
Should read - Canadian Pacific in Western Canada
totalled 13.6 billion ton-miles.

Page 2648 - 4th full paragraph, line 1:

Reads -I think in dealing with
Should read -I think that in dealing with

2648 - 4th full paragraph, line 2:

Reads - what constitutes a fair proportion and
the need
Should read - what constitutes a fair proportion
of the constant costs chargeable to
grain, and the need

2648 - 4th full paragraph, line 3:

Reads - for covering the constant costs,
has been well
Should read - for covering the constant costs,
the subject has been well

2657 - 3rd full paragraph, line 5:

Reads - want to mislead him again -- in some
of the grouping
Should read - want to mislead him again -- some
of the grouping

2657 - 3rd full paragraph, line 7:

Reads - again with suggestions of Dr. Edwards
Should read - again were at suggestions of Dr.
Edwards



2663 - 2nd full paragraph, line 6:

Reads - went over, in the first instance,
the general train
Should read - went over, in the first instance,
the general plan of

2663 - 2nd full paragraph, line 7:

Reads - work of the study -- I will go back
to.....
Should read - work for the study -- I will go
back to.....

2664 - 2nd full paragraph, line 3:

Reads - and the refinements and those aspects
of the costing.
Should read - and the refinements and those related
aspects of the costing.

2687 - line 1:

Reads - the fuel expense rose, and over a
wide range of.....
Should read - the fuel expense rose; and using a
wide range of....

2687 - lines 7-8:

Reads - by a certain amount, a certain
proportion, or, directly, if so
plotted, in so many cents per
Should read - by a certain amount, or a certain
proportion; or, taken directly,
when so plotted, by so many cents per

2687 - lines 9-10:

Reads -So they gave me the behaviour
of fuel expense. Then if I want to
cost
Should read -This analysis gave me the fuel
expense. Then if I wanted to cost

2687 - line 13:

Reads - could refer to this behaviour
demonstrated by
Should read - could refer to this cost behaviour
developed by



2687 - Lines 14 - 19:

Reads - these charts or by simple regression analysis. So if you find the fuel was variable, if you ascertain that the more traffic you use the more fuel you use, that is the end of it, that to move so much over so many gross ton miles, that was a certain expense, and engine crews and locomotive

Should read - these statistics and charts, that is, by simple regression analysis. Thus if you find the fuel was fully variable, and you ascertain that the more traffic you handle the more fuel you will use proportionately, that is the end of it, that is, to move so many gross ton-miles occasions a certain fuel expense. Similar studies covered engine crews and locomotive.

2688 - line 9:

Reads - more than one variable. Multiple regression cross-

Should read - more than one variable. For the expenses so analyzed multiple regression cross-

2699 - 1st full paragraph, line 13:

Reads -In such application the search
Should read -In such an application the intent

2699 - 1st full paragraph, lines 15 - 16:

Reads - In the case of Rail Form A we have long found it impossible to do a great deal of costing where the

Should read - In the case of Rail Form A, we had long found it impossible to do a great deal of detailed costing where the



2699 - 1st full paragraph, lines 18 - 19:

Reads - could have around 4 per cent, 5 per cent, 6 or 7 per cent and satisfy most of the need for reference

Should read - could have cost variations of around 4 per cent, 5 per cent, 6 or 7 per cent and still satisfy most of the needs for references

2699 - 1st full paragraph, line 20:

Reads - to cost. In that case we made.....
Should read - to costs. In such case we made.....

2699 - 1st full paragraph, line 21:

Reads -the accounts en masse together
Should read -the accounts en masse, taken together,

2699 - 1st full paragraph, line 22:

Reads - combined and weighted it and found that these per
Should read - combined and weighted, and found that the per

2699 - 1st full paragraph, line 23:

Reads - total operating expenses ranged.....
Should read - total operating expenses, ranged.....

2699 - 1st full paragraph, line 27:

Reads -than 90 per cent. In order
Should read -than 90 per cent. It was

2700 - Lines 2 - 3:

Reads - the wholesale basis which the Commission was having need for as a source of reference and in a great many

Should read - the wholesale basis for which the Commission had need as a source of reference, and to serve a great many



2700 - line 5:

Reads -and the desire to know
whether
Should read -and the desire was to know
whether

2700 - lines 6 - 7:

Reads - the rates were above the variable
costs by some significant margin, we
developed this Form A procedure.
Should read - the rates were generally above the
variable costs by some significant
margin, that we developed this Form
A procedure

2700 - line 8:

Reads - For per cent variability in it we used
80 per cent
Should read - For per cent variability we here used
80 per cent

2700 - line 10:

Reads -variability of the total
accounts.
Should read -variability of the total
operating expense accounts.

2700 - lines 11 - 15:

Reads - That 80 per cent was applied to train
crews and fuel which we knew was close
to 100, and it was also applied to
maintenance way accounts which we knew,
depending on the density of the run,
might range from 40 or 45 on up to
60 or 65 when you got on
Should read - That 80 per cent variable was applied
to train crews and fuel
which we knew were close to 100 per
cent, and it was also applied to
maintenance of way accounts which, we
knew, depending on the density of the
line, might range from 40 or 45 per
cent on up to 60 or 65 per cent when
you got on



2717 - 3rd full paragraph, line 4:

Reads - the methods followed conservatively
determines.....
Should read - the methods followed properly, but
conservatively determines.....

2744 - 2nd full paragraph, lines 1-2:

Reads - In those situations where they involve
traffic studies the overwhelming
proportion of the
Should read - In those situations here involved
grain traffic constitutes the over-
whelming proportion of the

2744 - 2nd full paragraph, line 4:

Reads - from other traffic are a very minor...
Should read - from the other traffic are a very
minor....

2744 - 2nd full paragraph, lines 5 - 6:

Reads -to meet their variable cost of
moving on the branch plus their
variable cost of
Should read -to meet the variable cost of
moving such other traffic on the branch
plus its variable cost of

2744 - 2nd full paragraph, line 8:

Reads - and the constant cost of.....
Should read - and in addition thereto the constant
cost of.....

2744 - 2nd full paragraph, line 9:

Reads - Then such branch line does not justify
its.....
Should read - Then such branch line without grain
traffic does not justify its.....

2744 - 2nd full paragraph, line 10:

Reads -and normally meets tests of
abandonment.
Should read -and normally meets the test for
abandonment.



2766 - 5th full paragraph, line 1:

Reads - When you go to the extreme with the coal
Should read - When you go to the extreme such as with the coal

2766 - 5th full paragraph, line 3:

Reads -just isn't enough traffic left to carry
Should read -just isn't enough non-coal traffic left to carry

2766 - 5th full paragraph, line 6:

Reads -the towns served, and that
Should read -the towns served, and this

2766 - 5th full paragraph, lines 10 - 12:

Reads -transportation in private and "for hire" trucking, the ability to pay there has substantially collapsed, so when you have to recover it where
Should read -transportation by private and "for hire" trucking, the ability to pay here has substantially collapsed, so then you have to recover the constant costs where

2769 - Lines 1 - 3:

Reads - Pacific had regularly assigned yard engines, but the switching yard complemented theirs by freight train switching at these yards.
Should read - Pacific had regularly assigned yard engines, but with the yard engine switching complemented by freight train switching within these yards.



Ottawa, Ontario,
Wednesday,
December 16, 1959.

---On resuming at 10.00 a.m.

THE ACTING CHAIRMAN: Gentlemen, will you come to order, please. Before we proceed, gentlemen, I would like to say there are a couple of rulings that we want to make. We quite realize that what we rule will be satisfactory to no one, particularly in the matter of dates. We are most anxious to consider the convenience of everybody, and we are most anxious to consider the issues, but we must not drift as a Commission and we must get on with our job. While it will not be satisfactory to many, probably, we trust you will bear with us and remember that we, after all, have to get on with our work. I will ask Mr. Cooper to read both rulings we have prepared.

MR. COOPER: The first ruling, Mr. Chairman, is as follows:

The Commission will adjourn after hearing the evidence in chief of the railway witnesses who it is understood are yet to be called with respect to the cost studies.

The Commission will reconvene in Ottawa on January 11th and will, at that time, hear the evidence and cross-examination of the witnesses being called by the railways on "Statutory and Related Grain Rates in Relation to the Freight Rate Structure", "Level of Rates for the Movement of Export Grain



in Western Canada which would be Just and Reasonable and Reasons Therefor" and "The Principles of Railway Rate Making" and as well the evidence of the Canadian Pacific Railway on "Necessity that Railway Revenues from Grain Traffic now Moving at Statutory and Related Rates be Adjusted in Order that this Traffic will Bear a Fair Proportion of Total Transportation Costs" and "Recommended Solutions to Enable Railways to Secure Revenues Based on Just and Reasonable Rates for Movement of Grain in Western Canada to Export Positions while Maintaining Existing Freight Charges on Grain to Farmers".

The Commission will also at its sittings commencing January 11th expect Counsel to proceed with cross-examination of the railway witnesses who will have given evidence on "Cost of Capital" if Counsel for the railways wish such cross-examination to proceed at that time. The Commission will also expect to receive and consider at its sittings commencing January 11th a report as to the requests of Counsel for the Western Provinces and for the Wheat Pools for further information as to costs and other matters from the railways, following a meeting between the Counsel and experts concerned to be held on as early a date in January as at all possible.

The Western Regional hearings will commence in Winnipeg on February 8th.

Cross-examination of the railway witnesses on cost studies, subject to what has been said above



with respect to "Cost of Capital" will be heard at sittings of the Commission to be held in Ottawa following the Western Regional hearings and commencing on a date to be announced.

I will proceed also, Mr. Chairman, at this time to the second ruling:

Objection was raised on December 10th by Mr. Sinclair to questions asked by Mr. Doherty and Mr. Frawley as to revenues received by Canadian Pacific Railway Company from the Consolidated Mining and Smelting Company of Canada, Limited.

The Commission notes that at pages 1938 to 1940 of the record Mr. Sinclair in his direct examination of Mr. Reid asked questions concerning the interest of Canadian Pacific Railway Company in the Consolidated Company, thus opening the subject for cross-examination.

The Commission considers that in any event the information requested is relevant under sub-section (d) of the Order-in-Council constituting its terms of reference and rules that a statement showing the revenue that Canadian Pacific Railway Company has derived from its investment in the Consolidated Company to December 31st, 1958 be filed as an exhibit. It will then be available to all Counsel as part of the record in the proceedings of this Commission.

Objection was also made by Mr. Sinclair on December 10th to questions raised by Mr. Varcoe relating to a land grant or the value of lands



granted by the Province of British Columbia to the Esquimalt and Nanaimo Railway Company. The Commission considers that such questions may prove to be relevant at a later stage under sub-section (d) referred to above but are not relevant at this time.

MR. FRAWLEY: Would the Commission object to having a discussion of the suitability of those dates off the record? If not, I will declare myself on the record.

THE ACTING CHAIRMAN: Gentlemen, we will consent to a discussion. The Commission is open at all times to discussion but we have to --

MR. FRAWLEY: I will discuss it on the record, sir. The meeting of January 11th would be quite impossible for me. I might say that I have a very considerable interest in the evidence that Mr. McCoy and Mr. Roberts are going to give on rate making. This is a very vital part of my case. But, Mr. Chairman, I simply just cannot be here and in Alberta at the same time.

I was confidently expecting to get out to Alberta and back before Christmas. These present sittings have made that impossible, and there is not much point in going between Christmas and New Year's, but I will have to go immediately after New Year's, and stay there until Mr. Parr comes for the meeting in the middle of January. I will have to come back for that, because that is crucial. Mr. Parr is coming here to discuss cost data with



ANGUS, STONEHOUSE & CO. LTD.
TORONTO, ONTARIO

Frawley,

2625

with the railways, and I will have to interrupt my work in Alberta for that purpose.

The only thing I can suggest is to put the Alberta sittings off and not have them in February -- to put them off until we have finished with the West coast.

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THE ACTING CHAIRMAN: We have not filed our itinerary of the West, and probably we can arrange to take Edmonton after Vancouver. That is something we can think about. We are most anxious to accommodate counsel. We might go to Vancouver from Regina, and then come back to Edmonton and take it on the way back.

MR. FRAWLEY: Of course, I do not know yet -- I would have to choose between absenting myself from this vital cross-examination of Mr. Roberts and Mr. McCoy and getting the work in Alberta moving and going. But, the Commission certainly is not going to -- I say this sincerely -- the Commission certainly cannot be held up because of my problems, but I have to state them to you, and that is the situation.

THE ACTING CHAIRMAN: I know.

MR. FRAWLEY: There is one other thing I should deal with. You suggested that we have some report to make on January 11th. Perhaps I did not understand the whole significance of it, but that is quite impossible because Mr. Parr cannot possibly come before -- the first date on which he could come to Canada is the 13th.

THE ACTING CHAIRMAN: You and Mr. MacKimmie have both made motions which we are anxious to have dealt with, and, consequently, we have inserted in our ruling a reference to that because we want to get on with the job so far as those motions are concerned, too.



MR. FRAWLEY: All it is is a mere matter of dates. We could not speak to that on the 11th because Mr. Parr will not arrive in Canada until the 13th. He has told me he can give me the 13th, 14th and 15th in which to come up and discuss cost data, so, that is out of the question. However, that is just a small matter. That could be put off, I suppose, until we have finished talking to Mr. Parr.

THE ACTING CHAIRMAN: Yes, that can be worked out. Mr. Sinclair?

MR. SINCLAIR: Mr. Chairman, I do not intend to say anything about the rulings of the Commission. I bow to them. What I want to know, as a matter of clarification, is, are you saying that the cross-examination of the cost witnesses -- that is, outside of cost of capital -- will be put off until the Commission returns from the Western tour? It would be of assistance to me in the arranging for the people to be here if I could have that as a fixed date. The Commission must know what its itinerary is on returning from the West, and if I knew it I could have my witnesses here for cross-examination on the fixed dates.

THE ACTING CHAIRMAN: We will let you know. We have fixed dates for the West, but we are not quite sure on what date we will start when we get back. However, we hope to be able to let you know before we leave here.

MR. SINCLAIR: That is fine. There is



one other point, Mr. Chairman and members of the Commission. I would take it that that would mean that the Commission would not be back here until some time in March. I would ask the Commission to direct that the substantive case that has been referred to on the Western provinces and of the grain trade -- the pools and the U.G.G. and North-west Line -- also proceed immediately following the cross-examination of the cost witnesses, and that the railways be given a full precis of their substantive case not later than, we will say, the 15th of February next. That would allow the railways approximately a month in which to consider the evidence to be called by these interests as part of their substantive case, and is in accordance with the treatment that the railways accorded the Commission and my friends.

THE ACTING CHAIRMAN: We will give consideration to your suggestion, Mr. Sinclair, but will make no direction today.

MR. MACDOUGALL: For the record, Mr. Chairman, I would like to associate the Canadian National with Mr. Sinclair's remarks in regard to the substantive case. This is a matter which also has been in my mind for some time. We have heard Mr. Frawley and the other provincial counsel speaking of their problems in connection with cross-examination, and the difficulty in obtaining instructions from their experts, and I think as far as the railways are concerned that Mr. Sinclair's



suggestion is quite a proper one, and that if there is a substantive case to be presented by the provinces or the pools they should know as soon as possible so that they are prepared to proceed following the cross-examination of the cost witnesses, if that is to be held in March; and we, I think, quite properly, should have notice of their substantive case in the same form as we gave notice of ours. I would certainly associate Canadian National with Mr. Sinclair's request, and ask the Commission to so rule as soon as it finds it convenient.

THE ACTING CHAIRMAN: We will make no direction at the moment, but we will direct in that respect.

MR. FRAWLEY: I wish to say nothing at all at this time except that I am always fearful that some months afterwards somebody will look at the record and say: "Well, now, Mr. Macdougall and Mr. Sinclair made some remarks and Mr. Frawley said nothing". I do not know now whether February 15th is a realistic date. As far as I know it is completely unrealistic from what I hear from these people in Washington. As far as I know they have not even sat down and put pen to paper. They are there working, but I just do not know what they are doing at all. As I said the other day, and I say it with some hesitation because I do not want to be misunderstood, but I do say it seriously, if I try to put the whip on them they will say: "Here is your brief, Mr. Frawley. It



is not worth that much to us."

MR. DOHERTY: We in Saskatchewan were hopeful we might have January free to enable us to go on with our regional case, and to prepare for the final hearings. We appreciate the circumstances which require the Commission to meet in January, but we are a small group working on this and it means it will place us at some personal inconvenience to come back to Ottawa in January. However, we are quite prepared to do it and to fully co-operate with the Commission on that matter.

(Page 2632 follows)



THE ACTING CHAIRMAN: We will now proceed, Mr. Sinclair.

MR. SINCLAIR: There is one other point I think possibly I should speak to and that is, as I took the note from your ruling this morning, that at the January hearings the cross-examination would take place if the railways desired or wished it.

THE ACTING CHAIRMAN: You have Mr. Smith, who we know is a very busy man and difficult to get, and you also have Mr. Toole, I think, on this subject, and the question of cost of capital, after all, isn't to us in the same category as the costing technique, and whether you are right or Mr. Frawley is right, on that argument on cost of capital we will not be interrupted, in any event.

MR. SINCLAIR: I would certainly arrange to do that, sir, and it would assist us, and we thank the Commission for taking that into account by having the cross-examination commence on a fixed date; it would assist us tremendously. Thank you very much.

THE ACTING CHAIRMAN: Mr. Sinclair, your next witness?

MR. SINCLAIR: I will call Mr. Wright now; he has some data to put in.

MR. WRIGHT: Mr. Chairman, we were asked to furnish some documents and information, and I have that available now if it is convenient to put it in.

THE ACTING CHAIRMAN: Yes.

MR. WRIGHT: At page 1538 of the record, during Mr. Edsforth's cross-examination, Mr. Cooper



asked Mr. Edsforth to furnish a copy of the Manitoba Agreement. Now, I have a photostatic copy of that agreement together with the statute confirming it, and perhaps it should be marked as an exhibit.

THE ACTING CHAIRMAN: Will you file it now?

MR. SINCLAIR: Yes, Exhibit 71.

MR. COOPER: That will be Exhibit 71.

---EXHIBIT NO. 71:

Statute of the Province of Manitoba: Chapter 39, "An Act confirming a certain agreement respecting certain railways and respecting freight and passenger rates" and a copy of said agreement, dated 11th February, 1901. (Schedule A).

MR. WRIGHT: At page 1867 of the record, Mr. Wood, acting for the grain people, during cross-examination of Mr. Edsforth, asked for information with respect to column 30, class rate, from Regina to Fort William and between Montreal and Toronto, 1948, before the 21 per cent increase and as it exists today.

Now, I have a statement here giving that information, not only for the Column 30, or Class A rates, but also for the other classes so that it is all complete, and that will be Exhibit 72.

MR. COOPER: Exhibit 72.

---EXHIBIT NO. 72:

Document entitled Transcript -- pages 1866-1867, Volume 14, December 9, 1959.

MR. WRIGHT: At page 1883 of the Transcript the Acting Chairman asked for the number of bushels



of wheat shipped by the Canadian Pacific. Mr. Edsforth had stated that 373 million bushels of wheat moved by the railways in 1958. Now, when he said 1958, I am instructed that he was referring to the crop year.

THE ACTING CHAIRMAN: Ending in July.

MR. WRIGHT: August 1, 1957 to July 31 1958, and during that period the number of bushels shipped by Canadian Pacific was 211,844,515.

THE ACTING CHAIRMAN: That is Canadian Pacific Railway traffic?

MR. WRIGHT: Yes. Now, at page 1966 of the transcript Mr. Cumming in cross-examining Mr. Reid, asked that we furnish a copy of the Agreement dated July 30, 1897, between the B.C. Southern Railway Company, the Canadian Pacific and the Kootenay Coal Company Limited, the name of which was subsequently changed to Crowsnest Pass Coal Company Limited. Now, I have photostatic copies of that, and that, I think, should be marked as an exhibit.

MR. COOPER: It will be Exhibit 73.

---EXHIBIT NO. 73: Photostatic copy of tri-partite agreement of 30th July, 1897 (Schedule A attached).

MR. WRIGHT: At pages 2120 and 2130 of the transcript we were asked to supply a copy of the agreement dated February 11th, 1898, between Heinze, Angus and Shaughnessy, and also a copy of the \$200,000 note to which reference was made, and I have photostatic copies of these documents. Perhaps they should go in.



MR. COOPER: The next number is 74.

MR. WRIGHT: Perhaps it should be Exhibit 74 and 74A, if that is agreeable.

MR. COOPER: Yes.

MR. WRIGHT: No. 74 is the agreement and 74A will be the note. That is all, Mr. Chairman.

THE ACTING CHAIRMAN: That is all?

MR. WRIGHT: That is all.

---EXHIBIT NO. 74: Photostat. of agreement between Heinze, Angus & Shaughnessy, dated 11th February, 1898. (Schedules A, B, C and D attached).

---EXHIBIT NO. 74A: Photostatic copy of promissory note dated December 3, 1898.

THE ACTING CHAIRMAN: Well, we seem to be up to date, Mr. Sinclair.

MR. SINCLAIR: I think so, sir.

The next witness is Dr. Ford K. Edwards, and I will now call him.



FORD K. EDWARDS, called

DIRECT EXAMINATION BY MR. SINCLAIR:

Q. Dr. Edwards, you were born in Lindsay, Ontario?

A. That is right.

THE ACTING CHAIRMAN: That is a good place to come from.

MR. SINCLAIR: Well, that is not the birth-place of the distinguished Mr. Frost; I think he was born in Orillia but he has been very close to Lindsay for a good many years, and I think it is interesting that Dr. Edwards also comes from there.

Q. Now, doctor, you graduated from Iowa State in electrical engineering in 1925; you went on to Yale where you took a Masters Degree in Economics, majoring in transportation, and received your M.A. from Yale in 1927 and received your Ph.D. from Yale in 1953.

From 1930 to 1935 you were on the teaching staff of the University of Southern California, covering courses in traffic and transportation.

From 1935 to 1939 you were transportation economist and examiner for the California Public Utilities Commission. That was formerly called the California Railroad Commission. That Commission, of course, regulates intrastate activities of the railroads, motor carriers and utilities.

From 1939 until 1950 you were with the Interstate Commerce Commission in Washington, three



years as principal economist, five years as head cost analyst, and two years as director of the bureau of accounts and cost finding.

Mr. Chairman and members of the Commission, it was during this period that Dr. Edwards developed cost findings techniques of the Interstate Commerce Commission, and principally under his direction, and these techniques included the finding of variable and all-inclusive costs, and particularly their relation to rate making and the determination of compensatory rates on various categories of traffic.

In this period with the Interstate Commerce Commission Dr. Edwards and his staff and his associates developed a series of costing procedures or formulae applicable to different types of situations that they encountered in resolving issues before the Interstate Commerce Commission. Rail formulae were developed which were identified as A, B, C, D and F, all with different degrees of refinement.

Very extensive applications on costs were made by the cost staff of the Interstate Commerce Commission under Dr. Edwards' directions, including the application of costs to the total traffic handled in the entire territories of the United States. As head cost analyst and director of the bureau of accounts and cost findings, Dr. Edwards' duties included the furnishing of a continuous flow of rail cost information to the commission for use in conjunction and in connection with its suspension powers



under the Interstate Commerce Act.

Dr. Edwards' duties also included the reviewing and reporting upon evidence with respect to costing of rail movements which were adduced by various parties in proceedings before the commission.

From 1950 until 1956 Dr. Edwards was the director of the Department of Coal Economics of the National Coal Association in the United States. His duties in this position included the appraisal and introduction of costing evidence relating to the rail handling of coal on rate applications and hearings.

In May of 1956 Dr. Edwards entered private practice as a transportation consultant, and he has continued in that work until the present time.

(Page 2644 follows)



In May 1st, 1956, Dr. Edwards entered private practice as a transportation consultant, and he has continued in that work until the present time.

THE ACTING CHAIRMAN: Well, Dr. Edwards, your name is a very familiar one in this chamber. I think I have dealt with you myself on occasion. We welcome you as a witness.

MR. SINCLAIR: Dr. Edwards has been an author, and so it might help my friends to know some of his writings. They include "Principle of Motor Transportation"; another article, "Study of Rail Cost Finding for Rate Making Purposes"; another, "Rail Freight Service Costs in the Various Rate Territories in the United States", which is a well known work and is generally referred to as "U.S. Senate Document 63". This brochure deals with the first major application of cost finding on a territorial basis. It is also known among my friends as "The Green Book", and it has subsequently been in another edition which Dr. Edwards might be surprised to know that Mr. Frawley and myself refer to as "The Salmon Book".

Dr. Edwards has also written numerous papers dealing with cost of service and value of service in rate-making. He has been a member of the American Economic Association for a considerable period.

MR. FRAWLEY: Before you leave the books, there is a very cute little book called "The Building



Blocks" that Dr. Edwards gave me one time. Perhaps you didn't see that -- "The Building Blocks".

MR. SINCLAIR: For freight rates.

Did you do that, Dr. Edwards?

THE WITNESS: That is right.

MR. SINCLAIR: Mr. Chairman and members of the Commission, Dr. Edwards acted as a consultant to Canadian National and Canadian Pacific in regard to the costing studies that they conducted.

Q. When, Dr. Edwards, do you recall, was the first time that Mr. Bandeen, Mr. Stenason and some other people went to see you in your office concerning this study?

A. Oh, it was in the mid-year, June and July, as I recollect.

Q. And have you spent a substantial time since that time with the cost people of the railways?

A. That is right.

MR. SINCLAIR: Now, Dr. Edwards, on behalf of the railways, sir, has prepared a precis of evidence which has been sent to the Commission and has been in the hands of my friends for some time. It is entitled: "Memorandum in Respect of (a) 'Method used to develop the cost of handling grain traffic moving at statutory and related rates'; (b) 'Results of cost study.'"

Now, that memorandum contained a precis of evidence which I will now present to the Commission in support of the method used to develop



the cost of handling grain traffic moving at statutory and related rates, which was a section of the joint submission of the railways and also results of the cost study, which was a section of the individual submission of each railway.

Q. Dr. Edwards, how would you describe the size of the movement of grain to export positions in Western Canada?

A. The grain and grain products moving at statutory and related rates in Western Canada constitute an extremely large segment of traffic. In 1958 the movement of grain from origin stations involved 126,704 carloads on Canadian National and 155,180 carloads on Canadian Pacific. There were additional car handlings arising from the movement of grain products from mills.

Q. What is the relationship of grain moving to export positions to total traffic on the railways in Western Canada ?

A. Grain and grain products moving at statutory and related rates constituted 40.3 per cent of the total revenue ton-miles of traffic handled by the Canadian National in Western Canada in this period. The corresponding proportion for Canadian Pacific was 42.2 per cent.

Q. Have you considered grain revenues in relation to the railway trackage in Western Canada and the size of the grain movement?

A. I have.

The larger portion of Canadian National



and Canadian Pacific trackage lies in Western Canada, that is, 55.4 per cent. The movement of the statutory grain and grain products traffic accounted for 41.3 per cent of the total revenue ton-miles handled by this plant. The adequacy of the revenue received for the movement of this traffic is therefore of the utmost economic importance.

Q. Now, what effect would these facts which you have just mentioned have upon the rule of rate-making and the application of rate-making principles?

A. Under recognized rate-making principles a just and reasonable level of rail freight revenues for the transportation of such a segment of rail traffic as grain must include a fair proportion of constant cost.

Q. How would you determine what you referred to as a fair proportion?

A. What constitutes a "fair proportion" of the constant cost involves economic and traffic consideration. The basic consideration from an economic standpoint is that a large segment of traffic, such as Western grain moving to export positions, should not be a burden on other traffic. To avoid being a burden on other traffic or on the railways, the revenues received from this large segment of traffic cannot be appreciably lower than total cost.

Q. How would the grain traffic pattern



in Western Canada affect, in your opinion, the costing of this segment of traffic?

A. Although the grain is gathered over a wide area, its movement from the various country origins to a limited number of export positions becomes channelled over well-defined routes and through terminals. Such grain movement, therefore, uniquely lends itself to costing. Costs were developed for the total 1958 grain movement.

In 1958 the traffic volume of the grain and grain products handled by Canadian National and Canadian Pacific totalled 13.6 billion ton-miles as compared to the 10-year average of 12.6 billion ton-miles. The year 1958 is a representative year.

Q. Now, Dr. Edwards, I think that you mentioned to me that you wished to bring to the attention of the Commission in regard to a statement you made about a fair proportion and what the grain traffic in light of its segment should be. Do you wish to draw to the attention of the Commission a decision of the United States Supreme Court that dealt with this?

A. Yes. I think in dealing with what constitutes a fair proportion and the need for covering the constant costs has been well dealt with, in my opinion, in the decision of the United States Supreme Court in Northern Pacific Railway Company versus North Dakota, 236 U.S., 585-596.

MR. FRAWLEY: What year?



THE WITNESS: 1915.

MR. SINCLAIR: Q. You have a small quote from there which would synthesise your position, I think?

A. Yes.

Q. Would you read that to the Commission?

A. Yes.

"The outlays --"

Q. Are you reading from a decision of the Court?

A. Yes.

"The outlays that exclusively pertain to a given class of traffic must be assigned to that class and the other expenses must be fairly apportioned. It may be difficult to make such an apportionment, but when conclusions are based on cost the entire cost must be taken into account."

MR. SINCLAIR: Thank you, Dr. Edwards.

Now, Mr. Chairman and members of the Commission, I wish to discuss with Dr. Edwards the collection of basic statistics relating to the study traffic for both of the railways. Dr. Edwards has prepared a summary of the basic data as to revenues and units of transportation service of grain and grain products moving at statutory and related rates for the year 1958, and I would



like to have that --

THE ACTING CHAIRMAN: That can be taken into the record.

MR. SINCLAIR: Yes. Because of certain evidence which has been given before, there are some changes in the figures that are before you.

COLLECTION OF THE BASIC STATISTICS
RELATING TO THE STUDY TRAFFIC

A summary of basic data as to revenues and units of transportation service for grain and grain products moving at statutory and related rates for the year 1958 is as follows:

<u>Item</u>	<u>Canadian National</u>	<u>Canadian Pacific</u>
1. Revenues	\$28,568,389	\$35,354,766
2. Number of grain carloads or- iginated	126,704	155,180
3. Loaded car-miles	116,998,374	130,408,170
4. Empty car-miles	67,010,564	75,290,305
5. Revenue ton-miles (000)	5,957,631	7,037,045
6. Gross ton-miles (000)	9,974,546	11,768,470

Q. I wish to discuss with you, Dr. Edwards, the bases used by both railways in compiling the various elements in the railways' cost and related traffic studies. First, revenues. What is your comment on that?

A. Revenues for grain moving directly to export points were available from waybill records.



On grain moved under the stop-off in transit privilege, reference was made to the inbound and outbound billing. The revenues shown on the waybills from each origin station to export position were checked against the tariff rates. The total revenues for the movement of the study traffic were available from accounting records and, being actual, no further explanation is required.

Q. Now, would you please comment on the method used by the railways in determining the basic unit of transportation service covered by number of carloads, loaded car-miles, gross ton-miles -- loaded, and revenue ton-miles?

A. Railway records show the carloads of the study traffic by origin stations. The determination of the loaded car-miles was based on the routing of the shipments from each station to each export position. The routing information was furnished by dispatchers and reviewed by senior transportation officers. Where the traffic moved over alternate routes the percentage distribution by the separate routes was obtained. The count of loaded car-miles was then accumulated for each subdivision traversed by the shipment between the origin station and export position. Revenue ton-miles, loaded car-miles and gross ton-miles - loaded were then determined by subdivisions of the line. Tare weights on grain cars as developed by samples on each railway were applied. Tare weight on Canadian National was 21.83 tons



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and on Canadian Pacific was 23.0 tons per car.
The higher average tare weight of Canadian Pacific
cars reflects the higher capacity cars as shown
by heavier average load per car.

(Page 2656 follows)



Q. Dr. Edwards, do you know what the average load per car was?

A. It was between 55 and 56 tons -- no, I will correct that; on the Canadian Pacific the average load was 54 tons and on the Canadian National 51 tons.

Q Now, will you deal with the development of milling in transit under the basic statistic group I mentioned before your last answer?

A. Grain milled in transit was similarly traced from country origin to milling point and the movement of the outbound mill products to the export position.

In developing loaded car-miles, gross ton-miles - loaded and revenue ton-miles, the method used understated the performance units based on established routing patterns as no allowance was made for back hauls or for deviations from the normal routing pattern due to operating requirements.

Q. Now, please comment on the development of empty car-miles and gross ton-miles empty of the study traffic as developed by the railways in their development of basic transportation units.

A. The empty car-miles were determined by tracing a sample of the prior empty movement on the cars used in the loaded movement of the study traffic. Canadian National drew a sample of 1,325 cars from the loaded cars terminated at the export positions. Canadian Pacific drew a sample of 3,700 cars from the car loadings at country origins and mills.

MR. FRAWLEY: Just so I will understand



it, this is in a sense an appraisal of the work Mr. Bandeen and Mr. Stenason have done. Is that the correct way to describe it?

MR. SINCLAIR: It is that and it is also the evidence of this witness. This witness has checked the work and he concludes point by point his appreciation of it and his opinion of it by sections.

MR. FRAWLEY: When he says this was done and that was done he is reviewing or appraising and appreciating the work that Bandeen and Stenason did?

MR. SINCLAIR: Yes, that is so. Also, I do not want to mislead my friend in any way, some of the tests done by Messrs. Bandeen and Stenason were tests suggested by Dr. Edwards and some of the -- I do not want to mislead him again -- in some of the grouping of the accounts and their functional relationships, ' again with suggestions of Dr. Edwards.

THE ACTING CHAIRMAN: In short, I take it the purpose of the evidence will be to establish that the method is sound?

MR. SINCLAIR: And that the work was carried out in a proper manner.

THE ACTING CHAIRMAN: Yes.

MR. SINCLAIR: Q. Now, we were going to deal with the development of empty car-miles statistics and gross ton-miles empty as the railways have done it in their cost study and you mentioned the samples used. Now, these samples of 1,325 cars for Canadian National and 3,700 for Canadian Pacific, how were the tracings of these car movements developed?



A. The tracing was obtained from car service records with the empty car movement determined from the point of release of the car from prior load to the point of loading in grain service. Such tracing provided the basis of the empty car-miles and the gross ton-miles -- empty, related to the outbound loaded movement of the grain for each origin subdivision. The sample was expanded on the basis of cars of the study traffic originating on each subdivision. Empty car movement east of the Lakehead and Armstrong, Ontario, was excluded in developing the empty car movement charged to the study traffic.

Standard statistical tests were applied to corroborate the adequacy of the samples drawn. Canadian Pacific Railway made additional tests of the consistency of the results by subdivisions. The resulting ratios of empty car-miles to loaded car-miles as determined by Canadian National and Canadian Pacific are very similar. The percentages of empty to loaded car-miles for the study traffic are set out below and these percentages are compared with the percentages of empty to loaded car-miles in Western Canada and on the System for all freight traffic, including grain, on the respective railways.

MR. SINCLAIR: Now, Dr. Edwards has prepared a table showing the percentage of empty to loaded car-miles for 1958 on Canadian National and Canadian Pacific both for grain and grain products which is the study traffic, and all commodities including grain both in western Canada and on the System, and possibly that



could be taken into the record.

THE ACTING CHAIRMAN: Yes.

Percentage Empty to Loaded Car-Miles
1958

	Grain and Grain Products Study Traffic	All Commodities <u>Including Grain</u> Western Canada	System
Canadian National	57.3%	55.6%	50.7%
Canadian Pacific	57.7%	53.8%	51.6%

MR. SINCLAIR: You will recall that during the evidence of Mr. Stenason Commissioner Anscomb asked a question concerning the empty car ratio on C.P. for grain and for System and Mr. Stenason gave him an answer which I have looked at and it is in accordance with the figures here. Now, will you go on please and comment on the facts set out in the table that is now part of the record?

A. It will be noted that the per cent empty to loaded car-miles for the study traffic is 57.3 per cent for Canadian National and 57.7 per cent for Canadian Pacific as developed from separate test studies. The higher percentage for box cars in grain service as compared to the Western Canada and System percentages for all freight cars and commodities is because a substantial number of grain cars move in a cycle between grain-loading points and the Lakehead, and experience a very low rate of reloading because of the lack of westbound traffic originating at the Lakehead.

As stated earlier, the development of



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2660

empty car-miles charged to the study traffic excluded empty car mileage on cars used in moving the western grain crops to export position where this mileage occurred east of the Lakehead. In this way there has been an understatement of the empty car-miles that could have been charged to the study traffic. In my opinion the method used to develop empty car-miles and gross ton-miles -- empty for the study traffic is conservative. The tests applied validate the samples used and checks made show that the work was carried out in a proper manner.

MR. SINCLAIR: Before going on to the next item perhaps we could take a short recess.

THE ACTING CHAIRMAN: Yes, we will recess.

---Short recess.



MR. SINCLAIR: Q. Dr. Edwards, I would like you to comment on the railways' method of developing way train data?

A. Yes. Before doing that I would like to say that during this intermission I checked on dates. It was the middle of the year when I started working intensively with the railways, but it was back in January of this year when I had my first meeting with the representatives and their staffs in Washington. The way time flies it seems to me almost like yesterday.

Q. Thank you, Dr. Edwards. Would you comment, then, on the railways' method of developing way train data, please?

A. Yes. Train statistics and train costs were compiled separately for through and way trains for each train run. While way trains operate primarily on branch lines, they also provide gathering services on the main lines.

Canadian National apportioned the total cost of operating way trains on each train run between grain and other traffic on the basis of the ratio of grain carloads originated to total carloads originated or terminated. The applicable average train and engine crew wages, including terminal detention time, locomotive unit mile costs (diesel) and certain train mile costs were applied. Fuel costs were separately applied as explained below.

Q. Now, for Canadian Pacific?

A. Canadian Pacific used its basic records



showing gross ton-miles, net ton-miles, fuel and crew wages by train run by direction, way trains separately from through trains. Way crew wages were separated between running and train switching on an hourly basis with running time on the pay basis of $12\frac{1}{2}$ miles per hour. Train switching fuel costs per engine hour were based on yard engine experience in Western Canada. The train switching expenses were prorated to grain on the basis of carloads of grain originating in way switching multiplied by the way switching minutes ---

MR. SINCLAIR: That is, times in minutes.

MR. FRAWLEY: You are not counting any times in minutes in connection with this Commission, I hope.

MR. SINCLAIR: I do not know whether that is directed to me, or to the Commission.

THE ACTING CHAIRMAN: That is a compliment, I think.

MR. SINCLAIR: Q. Would you go on, Dr. Edwards?

A. Yes. The train switching expenses were prorated to grain on the basis of carloads of grain originating in way switching multiplied by the way switching minutes per car developed from special study for each train run. The running expenses were based upon the proportion of gross ton-miles of the study traffic to total gross ton-miles for each train run. The crew and fuel costs assigned to grain were adjusted to reflect the lower resistance per ton for the heavily loaded grain traffic



relative to that for traffic of average loading.

THE ACTING CHAIRMAN: Dr. Edwards, we, as a Commission, understand that before the railways put anybody in the field they had discussed the plan with you?

THE WITNESS: Yes, I would say that is generally true. They had outlined to me their programme of making the switching studies and the broad basis of them, and that work was started early in the year. In these meetings held with me they went over, in the first instance, the general train work of the study -- I will go back to the beginning. At our regional meeting the concepts involved in costing the traffic and the problems involved, and the general procedures that they had in mind, were discussed, and also what my views were on their general procedure.

THE ACTING CHAIRMAN: Well, they had certain background data, but I think the evidence so far is that they went into the field actually in March. Your meeting with him was before then?

THE WITNESS: Yes.

MR. FRAWLEY: How long had they been working on it when you saw them in January, 1959?

THE WITNESS: I do not know what they had done before they had met with me.

THE ACTING CHAIRMAN: However, they had quite a bit of material ready when they went to you in the first instance?

THE WITNESS: I cannot tell you at the



moment what they might have done before January.

THE ACTING CHAIRMAN: You were discussing method largely?

THE WITNESS: Yes, the initial meeting was a discussion of the framework of the study, the methods and the refinements and those aspects of the costing.

THE ACTING CHAIRMAN: Go on, Mr. Sinclair.

MR. SINCLAIR: Q. Now, would you please comment on the development by the railways of through train data statistics?

A. Canadian National developed the number of constructive through freight trains chargeable to the movement of the study traffic. The number of such trains required to move the study traffic over each train run was obtained by dividing the equated gross ton-miles of grain moved over the train run by the average weight of through trains measured in equated trailing gross ton-miles. The computation of the average weight of trains gave consideration to the class and type of motive power used on each train run, the tonnage over the ruling grade on each train run by direction and the actual tonnage handled.

The total number of constructive trains for the train run is based upon the number of trains computed for the preponderant direction of traffic, multiplied by two. Allowance is made for dead-heading. Canadian National operates two general classes of trains on their main line; extras and manifests. In computing the number of constructive



trains of the study traffic where there were two classes of trains operating, trainload weights were based upon the weight of the extra freight up to the limit of the total number of extra freights operated over the train run. Beyond that point, the constructive trains are based on the weight of the manifest trains. All train weights were based upon diesel operation. The above computation produced the number of trains related to grain by train runs which were then multiplied by the trip miles to obtain the train miles. Train and engine crew wages were applied on a direct per trip basis by train runs. Fuel costs were developed for each train run by special studies reflecting grade conditions by direction and by weights of car. Separate fuel consumption factors were developed for the weight of the diesel units. These fuel costs were applied to the number of constructive diesel unit-miles used to move the study traffic by train runs and direction movement.

Q. Now, for Canadian Pacific may we have your comment on the way that company's cost people developed their data for through trains, please?

A. On through train runs, Canadian Pacific handles grain in both manifest and extra trains. The average weights of each are very similar. Canadian Pacific used its records showing fuel, crew wages, gross ton-miles, net ton-miles, and train miles separately for through freights as well as way freights, by train run and direction. Fuel and crew wage costs of moving the study traffic in through



trains were obtained by prorating the 1958 through train expenses to the study traffic on the relationship of the study traffic gross ton-miles to the total training gross ton-miles handled by the through trains. This procedure was followed separately for each train run on which the study traffic moved by direction of movement.

Q. Now, may we have your comment, please, on the approaches of the railways to the development of this data in the manner you have described?

A. The approaches followed by both railways in developing train performance data and fuel and crew wages have been to ascertain the actual expenses of moving the traffic. Way train performance and costs have been localized by train runs reflecting specific trains providing the origin gathering service and the crew compensation by train runs. Canadian National has distributed the costs of the gathering way train service on each train run to grain and other traffic on a carload basis, thus encompassing the country origin train switching service and the running service on that train run in the per carload cost applied. Canadian Pacific separated the origin gathering costs between switching and running. Switching costs were based on field studies of train switching conducted separately for each subdivision. Because of the diffusion of grain origin points over each gathering subdivision, both methods of determining way train costs of the origin subdivisions reflect the costs of the gathering operation for the study



traffic. In the case of through trains the procedures employed by both railways apply costs based upon the movement of the study traffic on the through trains operated between origin subdivisions and export positions. The fuel and crew wages over each train run are either actual or represent the actual experience, and carefully reflect the operating characteristics over each train run of each railway. Refinements to reflect the characteristics of the study traffic in its movement over each train run have been used.

Q. Now, what is your opinion as to this method and application as you have explained it to the Commission?

A. In my opinion, the procedures followed and checks made in developing train data and fuel and wage expense result in properly determining the costs involved.

Q. Dr. Edwards, would you please explain the development of car handling, loaded and empty, as used by the railways in their cost studies of grain moving to export positions in western Canada?

A. The number of loaded cars of the study traffic passing through each terminal in western Canada was developed from the waybills and the routing of the traffic referred to earlier. Loaded car handlings were based on the total 1958 grain and grain products movement. Empty car handlings were developed from the routing and



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2668

sample of empty cars previously referred to. Comment with respect to the adequacy of these samples has been given earlier. I am satisfied that the method adopted in developing car handling properly reflects this work element in handling the study traffic.

(Page 2673 follows)



Q. Now, we have had discussions of switching times by Mr. Bandeen and Mr. Stenason and I would now like to have you, for the Commission, discuss switching time as developed by the railways for use in costing the study traffic.

A. The switching performed at each intermediate terminal as well as at the destination points was based on comprehensive studies made at all major terminals in Western Canada through which the grain traffic moved. Representative studies were also made for groups of smaller terminals served by yard engines. Canadian Pacific made additional studies at stations and yards where switching is done by road crews. The results of studies at representative yards were applied to other yards of the same type. The matching of other yards with the yards studied was on the basis of similarity of traffic volume, yard characteristics and nature of switching operations.

These switching studies were all-inclusive in their scope in that they embraced not only grain but all other traffic in the terminal studied. They also included the switching of bad order cars, shop switching and non-productive time.

The specific elements of switching service accorded the grain cars, loaded and empty, as they moved from initial loading point through intermediate terminals and to final destination at the export positions were developed. At the export positions: Fort William, Port Arthur, Vancouver, New Westminster,



Victoria, Prince Rupert and Churchill the switch handlings were followed to the particular elevator or ship-side facility at which the individual car was unloaded.

Q. What about the milling-in-transit switch?

A. On the grain milled in transit, the switch movements of the inbound grain and the outbound grain products were followed to and from the individual elevators involved at milling points.

The comprehensive switching studies provided the switch engine minutes applicable to each element or group of elements of switching service performed on the cars of grain or grain products at every terminal throughout Western Canada. From the count of terminal car handlings, the total engine minutes of work performed on the grain and grain products cars were readily and accurately determined by multiplying the cars handled at each terminal by the appropriate minutes for the work performed by each element of switching service required by the study traffic.

Q. Dr. Edwards, having outlined the methods used by each of the railways, would you please comment on these methods and give your comment as to the work as you have checked it.

A. The program for the switching studies was carefully planned. All elements of switching were carefully determined in such a way that all yard engine time during the study period



was accounted for. The program for the studies and the training of the study parties and the yard forces was well organized and supervised throughout. A large proportion of the yards was studied without having to resort to extensive sampling. In the case of Canadian Pacific, the yards and terminals included in the field studies accounted for 74 per cent of the total yard freight switching in Western Canada during 1958, measured in terms of engine hours. The corresponding percentage for Canadian National is 83 per cent. The studies were conducted during the spring and summer months and consequently do not reflect adverse winter conditions when higher operating expenses exist and, therefore, understate the full cost involved in switching the study traffic.

Q. The Commission will recall on this latter point just mentioned by Dr. Edwards that Mr. Stenason yesterday made reference to that, and gave the view that winter switching would be 10 to 15 per cent higher than switching in the summer months. That was his evidence of yesterday.

THE ACTING CHAIRMAN: Yes.

MR. SINCLAIR: Q. Will you please discuss, Dr. Edwards, the development of car days for the loaded grain movement and the related empty movement?

A. Car days for the loaded grain movement and the related empty movement were obtained from samples drawn from the study traffic car



records. This was the same sample as used in developing empty car-miles and gross ton-miles - empty discussed previously. Actual car days for the grain car cycle based on car service records were employed. The observations on empty time were limited to empty car days experienced west of the Lakehead. The related empty car days were based on a tracing of the prior empty car movement and the date the car was dispatched from the station where made empty. Canadian National included such car storage time as was embraced in the observed car cycle adding thereto an allowance for shop time. Canadian Pacific excluded all empty storage time and shop time from its car cycle, and based costs on system active car days.

Q. Were any tests conducted?

A. Tests conducted by Canadian Pacific indicate that the periods of Western grain car peak loadings coincide with the periods of peak loadings of box car traffic generally.

Q. Any further comment on load studies?

A. Both studies distribute freight car repair expenses between use and time at 70 per cent versus 30 per cent respectively. The time portion of the expenses assigned to the study traffic includes an allowance for inactive car days. Both railways follow widely-recognized procedures of distributing freight train car expenses on a combination mileage and time basis which I have consistently used in railway costing.



Q. Dr. Edwards, now would you turn to a discussion of the methods and procedures used by the railways for the development of locomotive miles?

A. Canadian National computed the ratio of locomotive-miles to train-miles by divisions based on the operating records for 1958. Included were train switching miles, light engine miles, helper miles, and doubling miles. Locomotive-miles were converted to unit-miles by multiplying, for each train run, the locomotive-miles by average unit-miles per locomotive-mile by direction. In costing the study traffic, way trains were uniformly assigned one unit.

Q. Mr. Chairman and members of the Commission, we are not stopping to define with the witness the railway terminology, and what might sometimes be called jargon, such as helper miles and doubling miles, because we do know that on the Commission Mr. Balch is completely familiar with those terms.

Now, would you go on with the Canadian Pacific development of the locomotive miles?

A. Canadian Pacific developed locomotive-miles by the addition of train-miles and train switching miles, making no allowance for the movement of light engines nor for helping, and doubling. A test was made on Canadian Pacific to establish the unit-miles per locomotive-mile of the study traffic in relation to system unit-miles per



locomotive-mile. This test showed that there were more unit-miles per diesel locomotive-mile used in moving the study traffic than the average used in moving all freight traffic.

The distribution of locomotive maintenance costs on a unit-mile basis by Canadian National provides a sound basis for treating these elements of expenses. The method used by Canadian Pacific of distributing locomotive maintenance costs on a locomotive-mile basis has understated the costs which could be chargeable to these elements of expense to the study traffic as a result of excluding light engine, helper and doubling miles.

Q. Dr. Edwards, the Commission has had evidence on adjustments made by the railways for the movement of company service freight. Both Mr. Bandeen and Mr. Stenason dealt with this, and now would you please give the Commission your views on the adjustment for O.C.S. or non-revenue freight, as it is more properly termed, as used in the development of the costs for the movement of grain.

A. Both railways reflected the movement of non-revenue freight by increasing the transportation units by the ratio of the non-revenue ton-miles to revenue ton-miles. The Canadian National factor of 4.445 per cent was the ratio of non-revenue to revenue ton-miles for freight traffic in Western Canada. The Canadian Pacific factor of 3.954 per cent was the ratio of non-revenue to revenue ton-miles on the system. Non-revenue



freight was first apportioned between freight and passenger on a gross ton-mile basis. The freight non-revenue ton-miles thus developed were allocated to the study traffic in the proportion of revenue ton-miles of the study traffic to total revenue ton-miles - freight. Normal practice is to develop the cost of non-revenue freight on the basis of the overall cost per gross ton-mile for all freight traffic reflecting the loading characteristics of non-revenue freight. In the present study, the cost of moving non-revenue freight has been based upon the unit operating cost of moving the study traffic which has heavier loading characteristics than does non-revenue freight. This results in a conservative treatment of the cost of moving non-revenue freight and understates the non-revenue freight cost which could have been charged to the study traffic.

Q. Mr. Chairman and members of the Commission, I now would like to ask Dr. Edwards to discuss the methods used by the railways in the determination of variable costs and his comments in that regard. Will you please do that, Dr. Edwards?

A. The unit variable costs were developed through direct costing, special studies, regression analysis and allocation.

MR. FRAWLEY: I would like to make a statement at this time. I have retained experts in Washington that certainly understand regression



analysis; of that there is no question. Now, I don't pretend to understand it at all. I didn't major in mathematics at the university and I have a very limited knowledge of these higher mathematics when they get this high.

I know of no one better than Dr. Edwards to explain this, and I suggest to my friend or to Dr. Edwards that he stop and take a little bit of time and explain it so that it is understandable to the ordinary person.

After all, there are people here who are interested in this thing in Western Canada and in my province of Alberta and I would like, if it is possible, to have some simple, down to earth explanation of what these people did, using simple, homely illustrations, if possible, so that the man on the street in Calgary or in Edmonton or in Lethbridge can understand it. That would be saying to this that there was something done to our Crow's Nest Pass freight rates through the application of higher mathematics, and it was something known as multiple regression analysis, cross sections, models and so on, and frankly -- and I am speaking quite seriously -- I think the record should show it so that the ordinary person could understand just what the railways did; what Mr. Bandeen and Mr. Stenason did.

I venture to say that there is not a single farmer in Alberta who is interested in these Crow's Nest Pass grain rates and maintaining them that



understands at all what Mr. Stenason or Mr. Bandeen did.

Now, I suggest at this time that Dr. Edwards depart from the text and explain this. I went into the Library just now to get an ordinary Webster definition of regression, and I found that there is a mathematical definition of it, which I suppose is the one they are using. I don't suppose it means withdrawal or going back, so it must mean the mathematic definition.

Now, I do think, having in mind just the ordinary person in Canada that is interested in this, that there should be a down to earth --

THE ACTING CHAIRMAN: I think that Mr. Edwards is here to be helpful to the Commission and Mr. Sinclair has brought him here for that purpose, I hope.

MR. SINCLAIR: I certainly have.



THE ACTING CHAIRMAN: And now I think that we will leave Mr. Sinclair to -- certainly so far as, I am sure the whole Commission is concerned and certainly so far as the Acting Chairman is concerned, any simplification that Dr. Edwards would give us, from his great knowledge and experience would be very useful to us.

MR. SINCLAIR: When we had developed the précis of Dr. Edwards, and also when the précis of Mr. Bandeen and Mr. Stenason were developed, we did make a conscious and deliberate effort to develop this in a manner that certainly requires study but that was what we thought a simple presentation.

Now, when I was dealing with Mr. Stenason's evidence I did introduce some further simplifications, I thought, and I do think that my friend Mr. Frawley from Alberta either doesn't know all the farmers of Alberta when he says that none of them understands this, because there is a gentleman who is a farmer from Alberta who is not very far from you sir, who certainly understands the situation, and it is unfortunate that he is not known and his abilities are not known to my friend, but they are known to me, as is obvious by some of the questions that he put to Mr. Bandeen and Mr. Stenason; and, further than that, I am certain of this also, sir, that in the province of Saskatchewan there are farmers, scientific farmers, who will quite understand this, and even in the province of Manitoba,



sir, there are farmers who will understand what has been done. Now, even in the province of Manitoba there are some barristers who understand it, and that is going a lot lower than farmers.

So I think we will try to assist the Commission; that is why we have brought Dr. Edwards here.

THE ACTING CHAIRMAN: I am sure you will.

MR. SINCLAIR: But I think as Mr. Reid said about another matter, I think he is allowing this thing to be magnified in his own mind, the proportions it deserves, because it isn't that difficult if you just sit down and work at it.

THE ACTING CHAIRMAN: If there is any simplification I know you will give it to us.

MR. SINCLAIR: I certainly will, and I think Dr. Edwards' precis, and as we develop the thing, will make it simple.

MR. FRAWLEY: I am asking for the witness to do it. With great respect, I really think this is the time to do it. It is all very well for my friend to speak of Mr. Commissioner Platt. I am perfectly well aware that Mr. Commissioner Platt understands it. With great respect, there are a lot of farmers from Coutts to Grand Prairie who don't understand, and I represent all the people of Alberta. I am serious about this. I say that this requires some simple down-to-earth words to explain it. That is my position, and I know of no better witness in North America than Dr. Edwards



to do it.

MR. SINCLAIR: That is what I am doing.

MR. FRAWLEY: The word regression means: The act or privilege of going or coming back; withdraw. Does it mean that? No! What does it mean?

MR. SINCLAIR: Linear means linear and regression means regression.

Q. The unit variable cost that you developed as used by the railways, would you comment on that?

COMMISSIONER MANN: Perhaps it would help if Dr. Edwards could, at some time in the afternoon, give the origin of the word "regression" in the mathematical text, the father and son relationship that we heard about so much at one time from you.

MR. SINCLAIR: We would be glad to put that in.

Q. Could we now, Dr. Edwards, deal with this aspect as to the method used by the railway in developing the unit variable cost? What method did the railways use to secure the unit variable cost of the study traffic?

A. The unit -- I don't know where I was when Mr. Frawley broke in here. The unit variable costs were developed through direct costing, special studies, regression analysis and allocation. --

MR. FRAWLEY: Dr. Edwards read that before, and after he read that I made my remarks.

THE ACTING CHAIRMAN: What do you understand by, and what are we to understand, in simple words, "regression analysis"?



THE WITNESS: I think --

MR. SINCLAIR: I think, Mr. Chairman, that I have had enough experience in presenting things to the Commission that I should be allowed -- I didn't hear your question, but I must say that Mr. Frawley, not wanting to cross-examine, has rather disturbed my clients tremendously. I had nothing to say about the decision, I bowed to the Commission's ruling, but this matter is an important matter, and if my friend is further trying to delay this procedure by constant interruptions --

MR. FRAWLEY: I represent the people of Alberta and I want to understand what the witness is saying.

MR. SINCLAIR: We can't help it if Mr. Frawley can't understand it.

THE ACTING CHAIRMAN: I think I put the question to Dr. Edwards myself to give his simple definition of the words "regression analysis". What are we to understand by them?

THE WITNESS: Regression analysis in cost finding is a method of determining the behaviour of the expenses with different volume of traffic. I started using simple regression immediately after getting into costing work a way back in the thirties. One of the questions I had to face in the California commission -- they assigned me to a year's duty doing nothing but determining ways and means of costing the handling of grain traffic throughout the State of California. I was immediately faced, in dealing



with fuel or crew wages, with determining at the outset how fuel expenses were related to traffic handled. The very simple step followed and which had been followed by others before me in costing work was to take a simple chart and to plot on this chart -- across the bottom you have your traffic handled in gross ton-miles per track mile; vertically you have the quantity of fuel consumed, and as the total volume of traffic handled rose the volume of fuel consumed also rose, so that if this is my --

MR. SINCLAIR: I am sorry, Dr. Edwards, you can't get it on the record by pointing to a piece of paper and saying this does this.

THE WITNESS: We plotted the chart and the fuel consumption went up as the gross ton-miles went up. Our problem was to find out if part of these expenses were constant and unrelated to the volume of traffic handled, and if other expenses were related. So if I plotted a line and found as the fuel consumption rose, it rose proportionately with the increase in the gross ton-miles, then all my fuel expenses were variable with gross ton-miles. Putting it differently, from the trend line I was able to determine the additional dollars of fuel or gallons of fuel increase with every increase in the thousand gross ton-miles handled, and taking that trend line, regression line, I was able to determine for each thousand gross ton-miles, or million gross ton-miles, that



the fuel expense rose, and over a wide range of observations between divisions of the railroad with different densities and volumes, or taking the same divisions over a period of months when traffic rose and fell, I ascertained that for every increase in thousand gross-ton miles handled the fuel was rising by a certain amount, a certain proportion, or, directly, if so plotted, in so many cents per thousand gross ton-miles. So they gave me the behaviour of fuel expense. Then if I want to cost over a given division or section of the railway so many gross-ton miles that I wanted to move, I could refer to this behaviour demonstrated by these charts or by simple regression analysis. So if you find the fuel was variable, if you ascertain that the more traffic you use the more fuel you use, that is the end of it, that to move so much over so many gross ton-miles, that was a certain expense, and engine crews and locomotive expenses. So having made those tests, we were through with them.

THE ACTING CHAIRMAN: You adopted the method as a sound and safe method.

THE WITNESS: Yes, sir.

MR. SINCLAIR: Q. Now, you have told the Commission that the railways had used the direct costing, special studies, regression analysis and allocation. Now, would you go on with your comments, please, as to these methods?

A. Methods, other than regression analysis,



are self-explanatory. Simple regression, where only a single independent variable is included in the analysis, has long been used in railway cost finding to determine unit variable cost. More recently, and particularly with the advent of electronic computing equipment, multiple regression analysis has been employed. Multiple regression permits the measurement of cost behaviour associated with more than one variable. Multiple regression cross-section analysis was applied to the separate divisions or districts of each railway for the expenses incurred in the three-year period 1956, 1957 and 1958.

Q. Now, would you deal with road maintenance?

A. Road maintenance expenses are incurred with respect to facilities which, for the most part, are used jointly by all segments of traffic. Accordingly, it is not possible to segregate expenses attributable to any particular segment of traffic directly from railway accounts. In order to identify road maintenance expenses chargeable to the study traffic, multiple regression analysis was employed.

The unit variable costs for road maintenance were determined by regression analysis which established both the unit variable costs to be applied to the output units of the study traffic and, in addition, the cost associated with size of plant, such as miles of track, which was applied in



developing expenses of plant solely related to the study traffic.

Road maintenance expenses by primary accounts were divided into functional groups for purposes of regression analysis, such as: Superintendence and Overhead; track maintenance; fences, snowsheds and signs; station and office buildings; water and fuel stations; shops and enginehouses; and power plants. The expenses grouped together represent maintenance of similar facilities or facilities used for similar purposes. The expenses in each of these categories are subject to the same underlying factors insofar as their behaviour is concerned.

Q. That is in each of the groups you have mentioned?

A. Yes, sir.

Q. Yes. Would you go on, please?

A. It should be noted that under the Canadian Classification of Accounts depreciation accounting applies to a broad range of track items including rails, ties, grading, ballast and structures.

Q. Mr. Stenason or Mr. Bandeen -- I forget which, but I know one of them in his evidence said that was not the situation in the United States under their classification. Is that right?

A. Yes, sir.

Q. Now, would you go on further with depreciation as applied to road maintenance?

A. The system depreciation rates for



each category of investment are approved annually by the Board of Transport Commissioners. These rates were applied to gross property investment for each division of Canadian Pacific to arrive at the depreciation expense in each group of accounts. The approved rates of depreciation for Canadian National were used to develop the depreciation cost by primary accounts. The depreciation charges referable to any category of investment vary between divisions based upon the different levels of property investment for each division by categories of property.

Q. Was a test of track maintenance cost developed by the regression analysis made?

A. As a test, track maintenance expenses for branch line subdivisions in Western Canada on Canadian Pacific were predicted with the regression model and compared with actual expenses during the year 1958 obtained through field study and adjusted for changes in price and wage levels to the end of 1958. The expenses shown by the regression analysis were 4 per cent lower than the expenses developed by the field study.

THE CHAIRMAN: We will adjourn now.

---Luncheon adjournment.



---On resuming at 2.00 p.m.

THE ACTING CHAIRMAN: Gentlemen, will you come to order.

On the radio at noon the announcement was made that our Chairman has resigned. I am sure this is a matter of great regret not only to members of our Commission but to all those who are appearing before the Commission.

Personally I have known Mr. McTague for many years and we were very good friends. Frankly, when I was invited to act on the Commission I was moved largely by the thought that he would be Chairman of it. I very much regret that because of health reasons he has had to resign. I want to pay tribute to him as a man and to his great work as a Canadian because through the years he has always had the broadest outlook on any matter in which he took an interest.

On behalf of my colleagues and myself we express regret and trust that very shortly he will be restored to full health.

MR. FRAWLEY: Mr. Chairman, I, like you, learned with great regret at noon that the Chairman had sent in his resignation to the Prime Minister. I have known Charlie McTague and his family for many, many years and I felt that the choice that the Governor General in Council had made was a most happy one. I had personally looked forward to many days of pleasant and useful work in the Commission under his chairmanship.



Like you, I trust he will have a speedy recovery and that before long he will return to his practice in the very best of health.

MR. SINCLAIR: Mr. Chairman and members of the Commission, we of Canadian Pacific are sorry to hear that Mr. McTague, the Chairman, has felt that his health was such that he could not continue on in this work. We enjoyed our appearances before him and, as Mr. Frawley said, I am sure that everyone certainly wishes him a speedy recovery. Like you, Mr. Chairman, we have known of Mr. McTague's background and his interest and breadth of interest and his overriding motivation as a Canadian.

I think the Commission, as you said, was fortunate in having had him and I think that he will certainly be missed. But we have also, if I may say so, sir, had the opportunity of appearing before you in his absence and we have, as others who know you well, recognized the great motivations in you that you have spoken of in the Chairman, Mr. McTague. We are sorry that he has left us and we hope that in doing so he knows that the Commission's work is in competent hands.

MR. McDONALD: Mr. Chairman and Commissioners, I have known Mr. McTague since June of 1926 when he offered me a junior's position in his firm in Windsor. I was in contact with him a great deal while he was a judge in the Supreme Court of Ontario, both on the Trial Court and the Court of Appeal. We played bridge together and I was



looking forward to seeing him for some time while this Commission was holding its hearings. I regret very much that because of reasons of health he has found it necessary to resign.

I join with other counsel to you, sir, in expressing my sincere hope that he will recover his health within a short time.

MR. DOHERTY: Mr. Chairman, speaking on behalf of the Province of Saskatchewan I would like to associate myself with the remarks of yourself and learned counsel who have preceded me in hoping that Mr. McTague will be quickly restored to health and be able to return to his duties.



THE ACTING CHAIRMAN: Mr. Sinclair?

MR. SINCLAIR: Dr. Edwards.

Q. Before the noon recess we had been discussing certain of the road maintenance costs and expenses and I think we were just going to move into the area of other road maintenance accounts which I would like you now to discuss for the benefit of the Commission.

A. Before doing that, I was asked the origin of the word "regression" by Mr. Frawley.

Q. I think that was Commissioner Mann's request, the derivation of the word and where it came from.

THE ACTING CHAIRMAN: Who named the baby?

MR. SINCLAIR: I think that is a good way to put it and also a very fitting way to put it.

THE WITNESS: Well, it seems that a scientist by the name of Dalton in the 1860's wanted to test a hypothesis. The hypothesis was that the height of sons regressed to the heights of their fathers, the reference to regress being the sense of going back to. In the course of his studies he developed certain trend lines, and the statisticians apparently picked up that word "regressed" from Dalton's studies and have called these trend lines simple regression and multiple regression analyses. I think it is not too happy a reference back but that is the way it came by its name.

THE ACTING CHAIRMAN: Thank you, doctor.

MR. SINCLAIR: Q Now, dealing with the



development of unit variable cost by the railways for road maintenance accounts other than those you have spoken of, Dr. Edwards?

A. Other road maintenance accounts: The unit variable cost of road maintenance superintendence and overhead was determined by regression analysis with such expenses related to direct road maintenance expenses. The expenses for maintenance of fences, snowsheds and signs were related to the miles of fences maintained and not to output units. Maintenance of water and fuel stations was related to fuel and water expense by Canadian Pacific and to steam and diesel locomotive-miles by Canadian National. Maintenance of shops and enginehouses was related to direct equipment maintenance expense by both railways.

The unit variable costs, as developed by the regression analysis for the various groups of road maintenance accounts, were adjusted to reflect expenses which were not taken to account at the division level, which was the level used for the regression analysis. The adjustment factor for both railways was the ratio of total System expenses by the various groups of accounts to total division expenses in those accounts.

The portion of road maintenance expense variable with both freight and passenger traffic, excluding expense arising from solely related facilities, has been compared with the total road maintenance expense for 1958. On Canadian Pacific,



the average per cent variable for road maintenance expense is 37 per cent of total System road maintenance expense. For Canadian National, the average per cent variable for road maintenance expense of 39 per cent of total System road maintenance expense, is within the range which has been found in studies of railroads in the western United States.

Q. That percentage of 39 per cent, as you put it, for Canadian National, was dealt with by Mr. Bandeen in his evidence on the 14th instant in Volume 17, page 2428 of the transcript. I think the exact percentage is 39.25 per cent.

A. These percentages of variability are lower than any in Class 1 railroad because the study of which I have knowledge, the fixed track maintenance and depreciation cost per mile of track on Canadian National of \$1,265, excluding superintendence and overhead, is 10 per cent higher than the corresponding figure of \$1,147 for Canadian Pacific.

In my opinion, the use of regression analysis has enabled a more precise determination of the road maintenance costs which vary with traffic.

Q. Just a moment, Dr. Edwards. Yesterday when Mr. Stenason was on the stand my friend Mr. Frawley asked why we did not in preparing these cost studies use what he termed the Edwards Rail Formula A basis, and the matter was dealt with by Mr. Stenason. I said at an appropriate place when Dr. Edwards was on the stand I would also ask him to deal with it. May I ask you if you are now dealing with that issue



as to why regression rather than Rail Form A technique was used? Would this be an appropriate time to deal with that?

A. I believe it would. The Rail Form A technique used widely by the Interstate Commerce Commission and initiated by myself was a shortcut method for master costing of traffic. As has been mentioned earlier we developed a series of formulae starting with the use of averages in Rail Form A, also a Rail Form B, which is somewhat more refined, and Rail Form C of carload traffic which broke down the cost for the individual accounts, the per cent variable by separate account and inserted the direct fuel expenses by particular divisions in train runs. The crew wages--all train crew wages and engine crew wages were directly applied. In such an application the search was to arrive at the most accurate cost available. In the case of Rail Form A we have long found it impossible to do a great deal of costing where the specific cost was not of vital importance. We could have around 4 per cent, 5 per cent, 6 or 7 per cent and satisfy most of the need for reference to cost. In that case we made studies of the variability of all the accounts en masse together combined and weighted it and found that these per cent variable or the variable proportion of the total operating expenses ranged from something around 80 per cent or above to 90 per cent and above. In some cases we found that the per cent variable was even a little higher than 90 per cent. In order



to meet the demands for approximations of costs on the wholesale basis which the Commission was having need for as a source of reference and in a great many small cases where only a relatively minor amount of traffic was involved and the desire to know whether the rates were above the variable costs by some significant margin, we developed this Form A procedure. For per cent variability in it we used 80 per cent across the board, treating that as a conservative measure of the variability of the total accounts. That 80 per cent was applied to train crews and fuel which we knew was close to 100, and it was also applied to maintenance way accounts which we knew, depending on the density of the run, might range from 40 or 45 on up to 60 or 65 when you got on very high density main lines.

(Page 2705 follows)



So that is the substance of the treatment of the variability of the accounts as applied in Rail Form A. When we came to cost issues where great refinement was required such as in the division's proceedings where the relative costs borne by each railroad, or each group of railroads, was of great significance we did not use Rail Form A, but turned to what we called Rail Form C which endeavoured to do, and did do, the type of study which was applied here. Maintenance of way expenses were put in at their own degree of variability. Fuel was assigned as a 100 per cent variable. Train crews' and engine crew wages were taken directly from the individual train runs over which the study traffic moved.

I think that gives the story.

Q. Thank you, Dr. Edwards. You were saying in dealing with the road maintenance accounts here that in your opinion regression analysis had enabled a closer or more precise determination of costs associated with the study traffic; is that correct? Is that what you said?

A. Yes.

Q. Well, then, what is your further comment on the use of regression analysis in regard to the maintenance costs associated with the movement of grain as used by the railways in their costing studies?

A. Well, it has produced a per cent variable which is comparatively very low in relation



to those I am experienced in working with.

Q. Yes. I think your statement was that it was lower than any you had knowledge of -- any cost study you had knowledge of?

A. Yes, of a large class 1 railroad.

Q. Yes, what about the models used by the railways in the regression analysis in their cost studies? What is your comment on them?

A. The models used in the regression analysis by Canadian National and Canadian Pacific were suitable and meet accepted tests. The independent variables used in the various analyses were, in my opinion, correct and take into account cost relationships to the various output units which needed recognition. The output units used, such as gross ton-miles and yard and train switching miles, are performance units customarily employed in separating variable costs in the groups of accounts analyzed in the instant studies.

COMMISSIONER PLATT: Mr. Chairman, might I ask a question at this point?

THE ACTING CHAIRMAN: Certainly.

COMMISSIONER PLATT: Did you personally examine the residual curves?

THE WITNESS: Well, these were -- I examined some of the scatter diagrams resulting from these plottings. I was primarily interested in the R^2 and t tests. Regression analysis here as used in this study primarily relates to the maintenance of way accounts. I believe some 37 per cent



of the expenses involved were handled this way.

MR. SINCLAIR: Q. In regard to the question put by Commissioner Platt, Dr. Edwards -- and that was as to the residual curves -- did you have associated with you as a consultant of the railway anyone whom you were dealing with in regard to the regression analysis in particular?

A. Yes, we had Dr. Hood of the University of Toronto whom we relied upon and with whom I spent several days at various periods in a discussion of the adequacy of these regression equations.

COMMISSIONER PLATT: That is fine, Mr. Sinclair. I just wanted to know if it was well checked.

MR. SINCLAIR: Yes, does that --

COMMISSIONER PLATT: I am satisfied.

MR. SINCLAIR: Q. Now, what about the use of regression analysis, in your opinion, as to its being appropriate, and I am still dealing with road maintenance here?

A. Yes, the use of regression analysis, particularly with multiple variables where appropriate, has resulted in an accurate determination of the variable costs associated with the study traffic. The use of regression techniques, applied to road maintenance accounts, has given the cost studies of Canadian National and Canadian Pacific a marked advantage over studies not using these techniques.



Q. Dr. Edwards, may we now turn to equipment maintenance costs, and would you please give the Commission your comments on the development of the variable equipment maintenance cost charged by each of the railways in their studies?

A. The capacity of the average freight car, whether measured in tons or cubic feet, is necessarily very small in relation to the tremendous volume or tonnage which is tendered to a railroad daily for transportation. For example, over 300,000 cars of the study traffic are loaded by Canadian National and Canadian Pacific annually. Although changes in methods of loading and the capacity of cars may permit increased weights over an extensive period of time largely because of technological factors, nevertheless, the number of cars required over any period of time is closely geared to the volume of business handled. The traffic pattern and the resulting turnaround time for cars may vary between carriers because of differences in the economies of the areas served. However, for each carrier or region, such patterns for specific types of equipment tend to become fixed. In some cases, these patterns lead to a high degree of empty return and in other instances a relatively low empty movement. However, for each traffic pattern, a given number of freight cars is required to handle the traffic. The rail ownership of the motive power units and the freight train cars over a period of time is necessarily geared by



management to the requirements of the traffic handled.

Q. Dr. Edwards, what proportion of maintenance of equipment costs in the studies was developed by the direct method?

A. Over 80 per cent of maintenance of equipment expense chargeable to the study traffic was developed by the direct method. The level of all groups of maintenance of equipment expense, with the exception of superintendence and overhead and work equipment varies completely with traffic. The variable cost for work equipment was allocated through a recognized method of allocation.

Q. In your view is this approach to the determination of the unit variable cost for equipment expense sound?

A. Based on my experience it would require unusual factors to be present to depart from the basis that equipment maintenance, outside of superintendence and overhead and work equipment, varies 100 per cent with traffic. As explained earlier, where a segment of traffic is over 40 per cent of the total revenue ton-miles in a large area and where a great deal of experience by railway management in handling traffic of such magnitude is involved, it would be unrealistic to deal with the accounts involved except on a completely variable basis.

Q. How was the cost associated with the equipment superintendence and overhead developed?



A. The unit variable cost for expenses in the group "Equipment Superintendence and Overhead" was prorated by Canadian National and developed by regression analysis by Canadian Pacific.

Q. And work equipment?

A. For work equipment both railways allocated the expense. In both cases the relationship to develop variability was with the road maintenance accounts.

Q. Now, what is your overall opinion in regard to the procedures used by each of the railways in developing their cost studies in regard to the unit variable cost chargeable on account of the equipment expense?

A. In my opinion the methods used in the cost studies of both railways have properly developed the cost of superintendence and overhead and work equipment chargeable to the study traffic.

Q. Yes, and what would be your opinion in regard to the direct costing in regard to maintenance of equipment?

A. I believe that our direct costing of the maintenance of equipment is proper. I have used it throughout my entire experience in refined studies, the only departure being in this averaging out process which contemplates that the equipment is in at 100 per cent.

Q. Because you apply an overall variability to all accounts?

A. Yes, that is right.



Q. Now, for the assistance of the Commission, and in elaboration of the evidence that has been given by Mr. Bandeen and Mr. Stenason, will you discuss the determination of variable transportation costs as was done by them in their costing studies?

A. The largest proportion of the variable costs in the transportation group chargeable to the study traffic was secured by the direct method. The balance of the variable unit cost was developed by regression analysis except for a very small proportion which was developed through recognized methods of allocation.

The total variable cost for transportation chargeable to the study traffic for Canadian National is \$12.3 million and for Canadian Pacific is \$13.4 million. Of these amounts, over 70 per cent was developed by the direct method in each case. It is obvious that units of transportation, with minor exceptions, are directly related to the traffic handled and vary completely with that traffic. Where transportation expenses were not segregated in the accounts in such a way that the cost chargeable to grain could be established or where the transportation costs involved were joint and one or more output units affected the level of such costs, the regression method of distinguishing the costs applicable to the study traffic was used.

Canadian National used regression analysis to develop the unit variable cost for station



employees and expenses. Canadian Pacific followed a similar procedure except that this regression analysis also included dispatching. Concurrent with Canadian Pacific's regression analysis of station expense, a station time study was made in Western Canada.

Q. Pardon me, by that do you mean a field study?

A. That is right.

Q. And I think that was referred to by Mr. Stenason yesterday, if I recollect correctly. Yes; now this field study was made as well as the regression analysis?

A. That is right.

(Page 2717 follows)



Q. Will you go on and speak on the field study on station expenses, please?

A. The application of the time study would have produced a higher cost for the study traffic than did the regression analysis. Canadian National developed by regression analysis the unit variable cost per train-mile and per carload for dispatching and signal operation and maintenance as a group.

I am satisfied from checking and tests that the cost of station employees and expenses, as well as dispatching, charged to the study traffic by the methods followed conservatively determines the unit variable costs.

Q Now, would you please discuss the development of yard transportation costs chargeable to the study traffic?

A. Yard expenses vary 100 per cent with traffic with the exception of yardmasters and clerks and miscellaneous yard expenses. Yard expenses which vary 100 per cent with traffic are directly related to the traffic handled based on the engine minutes used in the various elements of switching the study traffic. To corroborate that yard expenses were completely variable with traffic, observations were made in the switching time studies which showed that the time involved for switching had a direct relationship to the traffic handled. Canadian Pacific developed by regression analysis unit variable costs in direct yard expenses that vary 100 per cent. This showed that there were



no fixed costs in direct yard expenses in relation to hours worked. Both railways used regression analysis to determine the unit variable costs for yardmasters and clerks and miscellaneous yard expenses. As would be expected, there were some fixed or constant costs in these expenses.

Q. A while ago you used a phrase "fixed costs", and you used fixed costs as a synonym for the phrase "constant costs"?

A. Yes, sir.

Q. Will you go on, please, and deal with your further comments on this matter?

A. I have checked the methods used by both railways over the complete group of yard expense accounts and am satisfied that the results properly reflect the costs chargeable to the study traffic.

Q. You are now talking of yard transportation costs?

A. That is right.

Q. Yes, and have you any further comments on transportation costs as a whole?

A. The large proportion of train expenses is clearly completely variable with traffic. For example, crew wages and fuel, both as regards over the road movements and switching, are 100 per cent variable, as are the expenses for grain doors, which are included in miscellaneous train expenses. Trains handling grain throughout Western Canada are operated on an "as required" basis. However, there are certain expenses applicable to train operations which do



not vary directly with miles operated; for example, enginehouse expenses and miscellaneous locomotive supplies.

Q. Just a moment. I think for the Commission that once again Mr. Balch could tell you, but I think in the jargon of the railways, the "as required" basis, even though the trains are set up in the working time cards, they can be annulled by train order; or, express can be run in addition to those set up in the time cards. We can go into this, but I am sure that Commissioner Balch understands.

COMMISSIONER BALCH: That is the extra train, and so forth?

MR. SINCLAIR: Or the annulling of it. We can develop it further, if you wish.

THE ACTING CHAIRMAN: That is sufficient.

COMMISSIONER MANN: Where you have a mixed train on a branch line, the "as required" basis doesn't hold true, does it?

MR. SINCLAIR: No. The mixed train that is set up on the schedule, Commissioner Mann, of course, operates, but they are reviewed at each time change, and are basically moved as to frequency or even as to continuation on the basis of traffic offered.

On the railroads and under the operating rules, mixed trains are freight trains. Under the operating code, mixed trains are designated as freight trains.

MR. SINCLAIR: Q. Will you go on, please?



A. In these cases, to distinguish the variable costs, regression analysis was used. The unit variable costs developed by the regression analysis reflect the characteristics of the operations, that is, diesel or steam. In the case of Canadian National, all diesel operation was used. In the case of Canadian Pacific, the actual 1958 steam and diesel proportions in Western Canada were used and a weighted unit cost was developed from the regression analysis.

The admixture of steam and diesel operations presents no difficulty except in the relatively small accounts now under consideration where the regression analysis method was used.

Q Now, the Commission will recall the evidence of Mr. Stenason yesterday in regard to the steam and diesel figures and what would have occurred if full dieselization had been applied, and they will also recall Mr. Bandeen's evidence concerning maintenance factors under a full dieselization, and I don't think we need to go further into that.

THE ACTING CHAIRMAN: No.

MR. SINCLAIR: Q. Now, Dr. Edwards, your comments, please, on the costs attributable to other primary expense accounts? Now, we have done with quite a number of them, but would you maybe deal with other primary expense accounts that you feel might be mentioned?

A. Other primary expense accounts such as crossing protection and drawbridge operation take to



account expenses which do not vary with traffic volume. Certain of these accounts, such as removing snow, ice and sand, in the cost studies have been treated as not variable as in the case of expenses in the accounts just mentioned. Undoubtedly there is a variable cost in some of these accounts as it is obvious that the volume of traffic affects the expense of keeping the line and switches clear in some degree. Another example is in the case of Canadian National where the primary accounts for the operation and maintenance of vessels are treated as not applicable to the study traffic although the cost of handling all such traffic on Canadian National moving to the export elevator at Victoria should be chargeable to the study traffic.

Q. What is the result of the way the railways have treated some of these primary accounts by not considering them as a variable or non-applicable?

A. By treating certain accounts that have some variability as constant, a conservative method has been adopted and the variable cost chargeable to the study traffic in the cost studies of Canadian National and Canadian Pacific have understated such costs.

Q Now, we would wish to deal, with your permission, Mr. Chairman, with a group of general accounts under the heading "Traffic and General, Communications -- Rail, Joint Facility Rents and Property Taxes." What is your comment on traffic and general, communications - rail and the other



major accounts or general accounts which I have just mentioned, Dr. Edwards?

A. Traffic and General, Communications - Rail, Joint Facility Rents and Property Taxes for Canadian Pacific were allocated to the study traffic on an overhead basis after excluding that portion of traffic and general expenses which are referable to passenger service and which would not be incurred if that service was not operated. The basis of such allocation was the ratio of such expenses to railway operating expenses, less the applicable passenger portion. The ratio was applied to the total variable operating expenses of the study traffic. This basis of allocation is a recognized procedure in developing an allowance for the proportion of expenses covered by this group of accounts chargeable to a particular segment of traffic. In my judgment it results in a proper distribution of these expenses to the study traffic.

Q. Now, particularly for Canadian National?

A. For Canadian National an allocation method was used for Traffic, Communications -- Rail and General, excluding Pensions. Specific studies were made in the case of Pensions, Taxes and Joint Facility Costs to arrive at the portion chargeable to the study traffic. For example, Canadian National determined specifically the joint facility costs in Western Canada and charged this to the study traffic.

Q. That was dealt with in the evidence of Mr. Bandeen specifically. Would you go on, please?



A. The major difference between the two railways in these groups of expenses is the Pensions and Property Taxes. The portion of pension expense found to be variable with the study traffic on Canadian Pacific was approximately \$900,000 greater than on Canadian National. This difference reflects different pension plans and different concepts as to what proportion of the total pension expense in the year may be considered as variable and what may be considered as constant.

Q. Now, what about property taxes?

A. The difference in regard to property taxes arises from the fact that Canadian Pacific has included taxes arising from solely related facilities and a portion of taxes for the balance of the plant. Canadian National has not included taxes on the balance of the plant.

Q. Now, would you please deal with the overall question of variability of operating expenses and in particular, Mr. Chairman, the witness will deal with variability, overall variability, in the studies and will relate that to the variability which he spoke of earlier in answering the question which I put to him that Mr. Frawley asked to be put yesterday, and which he has already dealt with, and he will relate the overall variability -- if you would, Dr. Edwards -- of these studies to that overall variability which you spoke about.

A. The results of the cost studies show a variability for railway operating expenses on Canadian



Pacific of 77 per cent and on Canadian National of 73 per cent.

Q. That is a typographical error. It was originally 78 per cent, and the change in this instance arose from the changes that were explained by Mr. Bandeen when he was on the stand, so that the figure for Canadian National, then, is what, Dr. Edwards?

A. Seventy-three per cent.

Q. Will you deal with these percentages, please?

A. These percentages of variability reflect the methods referred to earlier in this memorandum and the conservative approach which has been taken in a number of areas as noted. Somewhat higher percentages of variability might well have been expected in view of the large segment of traffic involved and the fact that certain expense items are particularly associated with the traffic and are directly segregated in the accounts; for example, grain doors and grain loss and damage claims. The percentages of variability earlier referred to ---

Q. You will recall in Mr. Stenason's evidence yesterday that I pinpointed those two figures at approximately a million dollars. Would you go on, please?

A. The percentages of variability earlier referred to may be generally compared ---

Q. That is 77 and 73 for Canadian Pacific and Canadian National?

A. That is right.



Q. Respectively?

A. Yes.

Q. Those percentages, you were saying,
could be compared with . . .

A . . . with the percentages of variability
set out in the Interstate Commerce Commission Explanation
of Rail Cost Finding Procedures, Statement No. 4-54,
which were found to range from 80 per cent to 90 per
cent. It would be expected that the percentages in
the instant studies would fall in the lower part of
this range due to density factors.

(Page 2729 follows)



MR. FRAWLEY: -- "Variability of operating expenses"? It varies with the volume?

MR. SINCLAIR: You are asking the witness?

MR. FRAWLEY: Yes.

THE WITNESS: Yes, that means variable with the volume of the traffic handled.

MR. SINCLAIR: Q. Now, Dr. Edwards, maybe we could deal with the variable cost of investment in road property and equipment, and you might give the Commission the benefit of your views in regard to the way this matter was handled in the cost studies of the two railways, please?

A. The cost of servicing the investment in plant and equipment is no less real than any other cost. Railway managements must gear plant and equipment to traffic volume and a part of the cost of servicing railway investment is necessarily variable with the study traffic.

The investment in locomotives and freight train car equipment is directly related to and completely variable with, the volume of traffic handled. As previously explained, over a period of time management must necessarily adjust its ownership of equipment to the requirements of the traffic handled. The unit variable cost for the amount invested in equipment was based upon the total net investment in motive power and freight car equipment. This method is basic to railway cost studies in the United States.

Q. Was regression analysis used in this



group of costs?

A. Regression analysis was used to develop the unit variable cost for road property investment. The unit variable investment costs were based on an analysis of gross property investment at the division level of Canadian Pacific and used in the cost studies of both railways. Gross property investment was related to miles of track, gross ton-miles, and yard and train switching miles. This regression analysis showed road property investment to be 40 per cent variable with traffic volume for Canadian Pacific and 21 per cent for Canadian National. The Canadian National result indicates that had they been able to analyze their own road property account, it is likely they would have shown a much higher variable investment cost. Thus their result in this instance is very conservative.

MR. SINCLAIR: I just wish to draw to the attention of the Commission that Mr. Bandeen dealt with that in his evidence and the reasons for it, and he expressed the opinion that there would have been higher variable costs, and Dr. Edwards' views are in substantiation of that view expressed by Mr. Bandeen.

Q. Now, the 40 per cent for Canadian Pacific and 21 per cent for Canadian National, could that be compared with the variability on road property investment in the United States cost studies with which you are so familiar?



A. Yes. The normal practice in the United States is to treat 50 per cent of the investment in road property as variable.

MR. SINCLAIR: I wonder if we could take a short recess now, Mr. Chairman. May we take five minutes now?

THE ACTING CHAIRMAN: Yes.

--- Recess.

MR. SINCLAIR: The next topic I would like to discuss with the witness and have his views before the Commission has to do with a subject a little different from what we had to do before.

MR. FRAWLEY: Before my friend proceeds, I was going to ask the indulgence of the Commission. On page 20 I perhaps wasn't paying as close attention as I should have been, and I find there, when Dr. Edwards began to discuss traffic and general communications -- rail, joint facility rents and property taxes, he said that they were allocated to the study traffic on an overhead basis after excluding that portion of traffic and general expenses which are referable to passenger service and which would not have been incurred if that service had not been operated. Then he went on -- "The basis of such allocation was the ratio of such expenses to railway operating expenses, less the applicable passenger portion".

I would like to ask him, would he be good enough to elaborate on the expressions "referable



to passenger service" and, further down, "less the applicable passenger portion".

How much did you know about the passenger costs or deficits when you wrote that paragraph, what implication did you mean to convey?

THE WITNESS: The implication I meant to convey, Mr. Frawley, was that the passenger portion of these overhead items would not have been incurred if the service were not operated or eliminated, in treating with the overheads. That would include advertising, industrial immigration bureaus, passenger agencies and traffic offices, revenues and associated accounting, passenger pensions, unemployment insurance, and such items as that.

MR. FRAWLEY: Yes. Well, how much information did you have about the passenger cost? That is what I was wondering about. You spoke about it as if it were an established figure, an established fact. Was that given to you or did you just supervise some work Mr. Bandeen and Mr. Stenason did in that regard?

THE WITNESS: No, I don't know what the total passenger service costs were. They are not taken into the account study. When we came to treatment of this traffic and general items, we lifted out those related to passenger. That is the only time that we specifically dealt with passenger items, was simply to set it aside.

MR. FRAWLEY: I may be asking my questions very inexpertly. I am wondering what those three



words mean -- "applicable passenger portion". There must have been a thing called "applicable passenger portion".

THE WITNESS: Well, applicable passenger portion means what appears in the three or four lines above -- "traffic and general expenses which are referable to passenger service and which would not be incurred if that service was not operated".

MR. SINCLAIR: And he gave you some examples earlier in his answer, auditing, advertising.

MR. FRAWLEY: It is not clear at all to me; that is all.

THE ACTING CHAIRMAN: Was there any breakdown which indicated any alleged passenger deficits at all?

THE WITNESS: No. I mean, costing the whole passenger traffic, as we did for grain.

THE ACTING CHAIRMAN: You had not those particulars at all?

THE WITNESS: No, sir.

THE ACTING CHAIRMAN: All right.

MR. SINCLAIR: I was going to deal with the next subject --

MR. FRAWLEY: This part of Dr. Edwards' evidence --

THE ACTING CHAIRMAN: Is subject to your objection.

MR. FRAWLEY: Yes, I object to that evidence.

THE ACTING CHAIRMAN: This is an assumption,



I understand, by Dr. Edwards, and he is not giving evidence.

MR. SINCLAIR: Yes, he is, sir, with respect to one point here, and that is what he has done in this field in other studies, and he is going to speak to that.

THE ACTING CHAIRMAN: It will be taken subject to the objection of Mr. Frawley.

MR. SINCLAIR: And the comment on behalf of the railway that I make on the objection.

THE ACTING CHAIRMAN: Yes.

MR. SINCLAIR: Thank you, Mr. Chairman.

Q. We wish to deal with the subject which is known in these proceedings as Cost of Money or Cost of Capital, and would you please give the Commission your views and comments in regard to that as it has been applied and used in the cost studies of the two railways.

A. In determining the cost of money to be applied to the appropriate investment in equipment and road property both of the railway cost studies use a net rate of 6-1/2 per cent. A detailed study of the cost of money applicable to rail investment of Canadian Pacific and the economic position of Canadian National in that regard is referred to in other memorandum.

MR. SINCLAIR: Those memoranda have been filed with the Commission, and they will be spoken to by Mr. C. W. Smith and Mr. Toole.

THE ACTING CHAIRMAN: Yes.



MR. SINCLAIR: Q. In regard to cost studies which you have prepared, supervised or presented dealing with specific segments of traffic, what has been your experience in dealing with this element known as cost of money?

A. In cost studies I have prepared dealing with cost of money in the United States, I have analyzed factors to derive a composite rate for railways' cost of money for debt and equity capital. In these studies I have found that rates for the cost of money to railroads in the United States would be above 6 per cent. Generally the cost of money for debt and equity capital is higher in Canada than it is in the United States and this is particularly so in recent times. A rate of 6-1/2 per cent net for cost of money is not excessive in my opinion.

Q. And dealing with certain overall averages in costs, Dr. Edwards, and particularly when you are considering burden studies in the United States, is there a different percentage sometimes used, by the I.C.C., for example?

A. Are you referring to the rate of return? Is that what your question has reference to?

Q. Yes, in overall costs. What overall figure did they use in these general averages of the various roads?

A. 4 per cent.

Q. Your evidence in regard to the cost studies you have made reference to was in regard to



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2736

specific studies where you had the cost of 6 per cent in the United States roads?

A. That is right.

MR. SINCLAIR: I thought that might be of some assistance to the Commission and also to my friends.

Q. Did you have something to add to that?

A. I was going to say I have used 6 per cent myself in recent cases.

(Page 2741 follows)



Q. Now, I wish to deal with this matter further, as I have said, with respect to other witnesses, but I do not think we require anything further from Dr. Edwards, at least at this time.

I now wish to turn to the question which is known as solely related facilities on which some evidence has already been put on record by both Mr. Bandeen and Mr. Stenason, and the costs associated with solely related facilities in reference to the grain traffic. Will you please let me have your comments in that regard, Dr. Edwards?

A. The variable expenses of handling any given study traffic include all expenses incurred as a result of the movement of such traffic. Included in these variable expenses are not only fuel, wages, car repairs and similar items, but also the cost of maintenance and investment in fixed plant facilities, the existence of which was occasioned by the study traffic. To illustrate, the cost of fixed facilities for the platform handling of lcl freight have been treated as solely related to the handling of lcl freight. I am here referring to cost studies in the United States. Coal and ore dock facilities have been treated as solely related to the coal and ore movement, that is, variable with the total movement of that particular traffic for which utilized. The principle of charging the cost of such fixed plant facilities as a variable cost of handling the study traffic requiring such facilities has been recognized by the Interstate Commerce Commission cost



staff and provision has been made in standard costing forms for such treatment.

Q. Now, what about branch lines?

A. Branch lines, the existence of which was occasioned by movement of any particular category of traffic have been costed as solely related to the traffic involved. This procedure was followed before the Interstate Commerce Commission in the Southern Governors' Grain Case; in Re Fresh Vegetables from Texas, California, Arizona and New Mexico; and in Re Transcontinental Divisions.

Q. In addition to branch lines is there other mileage?

COMMISSIONER MANN: Are there any citations for these cases?

MR. SINCLAIR: Only docket numbers.

THE WITNESS: I have in my notes the full title and the dockets which I shall read if you wish.

COMMISSIONER MANN: Well, as long as we have them. I thought perhaps Mr. Cooper might want to have them.

MR. COOPER: I would like to get the docket numbers.

MR. SINCLAIR: Would you read them into the record as it may be of assistance to have the docket numbers?

A. The first is Docket No. 31874..

Q. That is the Southern Governors' Grain Case?

A. Yes, Docket No. 31874..



Q. And the Fresh Vegetables from Texas, California, Arizona and New Mexico?

A. No. 31711.

Q. And the Transcontinental Divisions?

A. Docket 31503.

THE ACTING CHAIRMAN: They were all close together?

THE WITNESS: Yes.

MR. SINCLAIR: The last one, I think, have just completed their hearings last week; is that not so?

A. Yes, sir.

THE ACTING CHAIRMAN: But they were all three quite recent, from the numbers?

THE WITNESS: Yes, they were all cases in the last three or four years.

MR. SINCLAIR: Q. Now, in addition to branch lines solely related is there any other facility that as a railway cost analyst of some experience you look upon as coming within the category that are related to the variable cost of moving a segment of traffic?

A. An extensive body of branch line mileage, as well as elevator and yard trackage at the terminals and sidings from main tracks of the railways, is occasioned by movement of the study traffic.

Any severable fixed plant facility becomes solely related to the traffic using such facility when such facility and its continuance is occasioned



by the study traffic. In short, a branch line is solely related to the study traffic moving on such line when the revenues from the non-study traffic are insufficient to alone warrant the continued operation of the branch. The same economic test is here applied as that commonly used in the economic determinations of the justification of specific branches or other facilities.

Q. Would you illustrate what you have just said?

A. In those situations where they involve traffic studies the overwhelming proportion of the traffic moved on the branch and the remaining revenues from other traffic are a very minor part of the whole and insufficient to meet their variable cost of moving on the branch plus their variable cost of movement over the main line in reaching the branch and the constant cost of maintaining the branch. Then such branch line does not justify its economic existence and normally meets tests of abandonment. In such case that branch line is economically related to the study traffic and the burden of maintaining that branch must necessarily rest upon the study traffic, excluding only such contribution as the other traffic makes above its variable expense.

MR. SINCLAIR: You will recall, Mr. Chairman, that in the evidence yesterday the revenues for branch line operation were credited, as Mr. Stenason said, in toto after making the necessary division between main line and branch line notwithstanding



whether they were tested against the variable costs, not only the excess given, but the whole amount.

Q. Now, will you go on and deal with the branch lines in the instant studies of the railways?

A. Branches which would not be economic but for the existence of the study traffic are solely related to the study traffic, except where required for operational reasons. This means that the fixed portion of the cost of maintaining the branch becomes a cost variable with the movement of the study traffic. These fixed costs consist of the fixed road maintenance and investment expense. They were developed by regression analysis and are referred to as the "costs associated with size" per track mile, that is, the minimum maintenance and investment cost, after eliminating the variable portion of such costs.

In applying the constant cost per track mile of the study traffic, credit was given by Canadian Pacific for all revenues earned on movement of the non-study traffic which are in excess of the variable costs -- main and branch line -- of handling the non-study traffic.

Q. That was the reference I made to Mr. Stenason's evidence.

A. The fixed portion of the road maintenance and investment costs of facilities solely related to the study traffic, in the instant studies, have the characteristics of variable expenses. Any determination of total variable cost requires that this body of costs be properly grouped with the other



variable expenses.

Q. And your opinion as to the method of approaching solely related facilities and cost in the studies of the two railways?

A. In my opinion, the procedures followed properly reflect the expense behaviorism as related to the traffic being studied with its tremendous demands upon plant facilities of the railways in Western Canada.

MR. SINCLAIR: Now, Mr. Chairman and members of the Commission, I wish to deal with the segment of costs which has been referred to as constant costs or fixed costs and to ask Dr. Edwards to give the Commission the benefit of his views in regard to this segment of costs and the treatment of it in the study of Canadian National and Canadian Pacific, which is before the Commission.

THE WITNESS: The magnitude of the study traffic, both in absolute amount and in relation to total freight makes it imperative that revenues secured from movement of the study traffic be sufficient to bear a substantial portion of the total constant costs of the railways. The larger the volume of the traffic in issue to total traffic, the greater the need that a fair proportion of total constant costs be borne by such traffic.

Constant costs are expenses found not to be variable with traffic volume. They include, in large measure, expenses related to maintenance and investment in road properties, both line and yard,



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2747

as well as supervisory expenses, traffic expenses, general expenses, and property taxes.

Constant costs represent the difference between the total costs and the total variable costs of freight and passenger. The passenger train service revenues do not cover the total variable cost for the passenger train service. The resulting passenger train deficits were not included in the constant costs, these being considered a management problem.

(Page 2753 follows)



MR. SINCLAIR:Q. That is under the Canadian National-Canadian Pacific approach to this in the instant studies?

A. That is right.

MR. FRAWLEY: Well, now, if --

MR. SINCLAIR: Q. Would you go on, please?

MR. FRAWLEY: If I might --

MR. SINCLAIR: Maybe you could cross-examine.

MR. FRAWLEY: Well, if my friend objects I am not going to --

THE ACTING CHAIRMAN: I think, possibly, some questions which are not cross-examination, Mr. Sinclair, might ease a meeting of the experts and counsel early in January -- I mean in respect of passengers and so on.

MR. SINCLAIR: I would -- well, it may be.

MR. FRAWLEY: Dr. Edwards, if you will excuse me -- I am not being critical -- but what warrant did you have for the statement that passenger train service revenues do not cover the total variable cost for the passenger train service?

THE WITNESS: That statement was furnished to me by the two railroads involved.

MR. FRAWLEY: Can the expression "total variable cost" be read as synonymous with "bare out-of-pocket cost"?

MR. SINCLAIR: Well, now, wait a minute. If we are going to define phrases --



MR. FRAWLEY: That is what we have been doing all day -- asking to have a phrase defined. What is the total variable cost for the passenger train service? Surely the witness can clarify what that means without taking up too much time.

MR. SINCLAIR: I am sure Mr. Frawley is indicating his complete knowledge of the situation, and I find it difficult now to understand why he applied to this Commission to adjourn the cross-examination. I find it very difficult to understand that.

MR. FRAWLEY: When you say "total variable cost" there, Dr. Edwards, do you mean total out-of-pocket cost?

THE WITNESS: I do not mean the bare out-of-pocket cost that you are referring to. You used that term.

MR. FRAWLEY: Yes, I said "bare out-of-pocket cost".

THE WITNESS: Well, that term is used in many --

MR. SINCLAIR: Just a minute, witness; maybe Mr. Frawley would define "bare out-of-pocket cost".

MR. FRAWLEY: We will just drop the adjective and say "out-of-pocket cost".

MR. SINCLAIR: No, I would like it defined.

MR. FRAWLEY: Well, my friend cannot get a definition from me.

THE ACTING CHAIRMAN: My only purpose in



allowing Mr. Frawley to ask any questions was to, perhaps, ease the matter of the meeting which comes early in the month in respect of passenger deficits.

MR. SINCLAIR: I might say that this approach of my friend is certainly not going to ease it.

MR. FRAWLEY: All I am endeavouring to find out is what evidence Dr. Edwards was giving with respect to the passenger deficits.

THE ACTING CHAIRMAN: He was just told that there was a passenger deficit, but not what --

THE WITNESS: Yes, to get the full amount you would have to run a full passenger study comparable to the character of the one we have run on this traffic.

THE ACTING CHAIRMAN: Have you a dollar mark in any way put on the passenger deficit, so called?

THE WITNESS: No, sir.

MR. FRAWLEY: All I am endeavouring to get from you, Dr. Edwards, is a definition of your phraseology. I will put one to you, and you can tell me if I am right, or not. When you say "the resulting passenger train deficits" you mean passenger train deficits which result because the passenger revenues do not cover out-of-pocket cost?

MR. SINCLAIR: Just a minute. Mr. Chairman, he has already said that that statement was given to him by the railways. If Mr. Frawley wants



to ask the railways about that then the witnesses will be --

THE ACTING CHAIRMAN: I think so far as Dr. Edwards is concerned, Mr. Frawley, he is going on hearsay evidence. He was told that there was a passenger deficit, but the amount of it he does not know. You did not enquire, I suppose, Dr. Edwards?

THE WITNESS: No, sir, that would need an extensive study to get the full amount of the deficit. You can tell whether revenues cover variable costs without putting in all the variable costs. That is a quick test.

THE ACTING CHAIRMAN: I suppose, as a matter of fact, Dr. Edwards, that in regard to the passenger train service in your country, as well as ours, it is more or less notorious that there are no --

THE WITNESS: Yes, sir, and I have run many studies of the passenger deficits on the American roads, and I was for years on the committee on passenger deficits of the National Association of Railroad and Utility Commissioners, determining the full scope and gamut of the passenger deficits. Having regard to all the items that come in it is a very extensive study. Also, short studies have indicated that there is a deficit there without finding out the full amount of it.

THE ACTING CHAIRMAN: Very well, Mr. Sinclair.

MR. SINCLAIR: Q. Now, you had told



the Commission that the railways had informed you that there was a passenger train deficit, and that you had ascertained that it was not included as part of constant costs, and that this was considered by the railways as a management problem. How does the cost section of the Interstate Commerce Commission deal with the passenger train deficit in a costing study of a segment of traffic such as has been done by the railways in this case?

A. The passenger train deficits in relation to their variable costs are laid as a burden on the freight costs in arriving at total freight costs.

Q. And do they add any other deficits that are known to exist in the United States?

A. They also include l.c.l. deficits.

Q. Which have been ascertained to exist in the United States?

A. Yes.

Q. Now, when the cost section, or studies that you have been in charge of, dealt with constant costs and apportioned them or distributed them over other segments of freight traffic, what method of apportionment or allocation to segments is followed?

A. At one time the cost section of the Interstate Commerce Commission apportioned the constant costs over the segments of freight traffic in proportion to the variable expenses of handling each segment. On the heavier loading traffic such as grain with comparatively low unit variable



costs, the effect was to place a lower cost per net ton or ton-mile on such traffic than was apportioned to the lighter loading higher unit cost traffic such as merchandise. The cost section subsequently changed its basis of apportionment to a flat ton and ton-mile basis.

Q. This is having to do with all the constant costs as a group?

A. Yes.

Q. Including the passenger, which you have spoken about?

A. Yes, sir.

Q. Now, what about the method followed in the studies which have been presented to the Commission by Mr. Bandeen and Mr. Stenason on grain in the instant case? What method for distributing constant costs, including passenger train deficits, as you have said, was adopted in these cost studies?

A. In the cost studies of both railways, the share of the constant costs apportioned to the heavy loading grain traffic is based on the proportion of study traffic variable expenses to total freight variable expenses, excluding the costs of solely related facilities: That is to say, on the method used and later abandoned by the cost section of the Interstate Commerce Commission.

Q. And what is the result of following the method that the railways in the instant case



followed, and the method that the Interstate Commerce Commission, as you said, abandoned?

A. The constant case allocated to grain are on a conservative basis; first, because of the apportionment of the constant costs on the basis of the variable expenses, and secondly, because of the exclusion of passenger deficits. If the Interstate Commerce Commission procedure of allocating constant costs on a ton and ton-mile basis, but without including any element of passenger deficit, had been followed by Canadian Pacific, the effect on the constant cost chargeable to the study traffic would have been:

	<u>Constant Costs of Study Traffic</u>
If apportioned on Ton and Ton-Mile basis	\$29,600,000
If apportioned on Variable Expense basis (15.306%)	<u>18,400,000</u>
Increase if apportioned on a Ton and Ton-Mile basis	<u>\$11,200,000</u>

Q. What would the result have been? Would it have made it chargeable to grain in the Canadian Pacific if it had followed the I.C.C. basis -- that is, the ton and ton-mile basis of distributing constant costs, and including any passenger deficit? What would it have done on Canadian Pacific's figures, Dr. Edwards?

A. The I.C.C. basis would have increased the constant costs by \$11,200,000.



Q. That is, the constant costs chargeable to grain?

A. Yes.

Q. By \$11,200,000?

A. Yes.

Q. Now, Dr. Edwards, you have gone through in your evidence, and in some detail, the various elements of cost and the various methods, and you have expressed your opinions in regard to them both as to the development of the basic statistics, the units of transportation service, the unit variable costs and the constant costs. Would you please give the Commission now your general appraisal of the constant studies of Canadian National and Canadian Pacific as they are before this Commission?

A. As stated previously, because of the factors referred to, the movement of grain and grain products to export positions in Western Canada uniquely lends itself to costing. The refinements which were possible because of the nature and characteristics of the traffic movement under study have been utilized effectively to provide a most satisfactory identification of costs with the study traffic. As stated, in a number of areas, particularly in regard to using other than winter operations for development of switching time for the study traffic and the development of car-miles on normal routing only, procedures were adopted which understated the variable cost. Under-statements in areas other than those referred to



have also been dealt with previously. In the portion of constant costs associated with the study traffic there is an understatement on the basis described earlier which amounts to some \$11,000,000 for Canadian Pacific alone.

Overall, it is obvious from the procedures followed by the railways in the cost studies, a deliberate course was adopted so as to be conservative in determining both the variable and constant costs chargeable to the movement of grain and grain products to export positions in Western Canada.

Q. That is the evidence you have come here to give to the Commission at this time?

A. Yes, sir.

MR. SINCLAIR: As we say here: "Please answer my friend".

THE ACTING CHAIRMAN: Dr. Edwards, we are very pleased that you are here giving evidence. As you know, cross-examination has been reserved, and you will necessarily have to come back. Quite apart from that there are certain questions, because of your long experience and your reputation as an authority, that I would like to ask you when you come back relative to the whole problem. I will not ask them now because I do not think it is fair, but I would suggest that I might possibly ask you about costs of service and value of service, and what your view is on that, and there may be other questions we would like your opinion on.



In order that you not be taken at short notice we will communicate with Mr. Sinclair and tell him on what matters we would like your considered opinion.

MR. SINCLAIR: We would be very glad to have Dr. Edwards available to the Commission for whatever discussions it wishes to have with him at any time. Indeed, sir, I must say this, that we had told the experts for my friends, that if they wished to discuss these cost studies of the railways with Dr. Edwards, who happens to live in the same town as they do -- namely, Washington -- that they were completely free to go and see him. I take it that the Commission wishes to have discussions with Dr. Edwards on different topics, and I take it that at some appropriate time you will say on what date the Commission wants to see him.

THE ACTING CHAIRMAN: Yes, we think it is our duty to pick the brains of everybody who comes along.

MR. SINCLAIR: That is right, sir, and I think discussions with Dr. Edwards, and other people as they come, can be had by the Commission -- and I take it this is what you have in mind -- informally in order to get to the basis of the problem.

THE ACTING CHAIRMAN: We want to act as informally and as formally as we can. Now, I think Commissioner Mann has a question on the precis.

COMMISSIONER MANN: Yes, I think we have a few minutes left. On page 1, paragraph 4 of the



precis you say:

"The larger portion of Canadian National and Canadian Pacific trackage lies in Western Canada, that is, 55.4 per cent."

Would there be a breakdown available as between the two railways?

THE WITNESS: Yes, sir. Shall I read it into the record?

MR. SINCLAIR: I think that is what Commissioner Mann wishes you to do.

THE WITNESS: Canadian National, Western Canada, 15,053.6 miles; system totals 31,616.9 miles; per cent 47.6 -- by the way, I guess you only wanted the percentages in any event, rather than the figures?

COMMISSIONER MANN: Yes.

THE WITNESS: Canadian Pacific is 63.3 per cent.

MR. SINCLAIR: Q. And those two mileages together make up the figure you have used of 55.4 per cent?

A. I have not given the Canadian Pacific miles, but apparently that was not desired.

COMMISSIONER MANN: No.

MR. SINCLAIR: Then, the breakdown is 47.6 per cent for Canadian National in the West and 63.3 per cent for Canadian Pacific.



MR. FRAWLEY: Do you know where the Northern Alberta Railway fits into that, if it does?

MR. SINCLAIR: It is not there.

MR. FRAWLEY: It is not there at all?

THE WITNESS: It is excluded.

MR. FRAWLEY: Excluded in the case of both Canadian National and Canadian Pacific?

THE WITNESS: Yes.

COMMISSIONER MANN: On page 2 in the first full paragraph you say:

"The basic consideration from an economic standpoint is that a large segment of traffic, such as Western grain loading to export positions, should not be a burden on other traffic."

Then you say:

"To avoid being a burden on other traffic or on the railways, the revenues received from this large segment of traffic cannot be appreciably lower than total costs."

Now, a similar statement appears also at page 25 of your precis, paragraph 4; it is the paragraph starting, "The magnitude of the study traffic", and my question there is how large in your opinion must the segment of traffic be before it is asked to yield revenue cost to total cost?

THE WITNESS: Well, I don't know where the proportion would lie, but when it is as large as this one it fairly seems to follow that it has a very heavy burden to bear. You asked the



specific question, what percentage -- where would you draw the line?

COMMISSIONER MANN: The approximate percentage range?

THE WITNESS: This is a very unique study. In all my life I have never had occasion in all my experience to deal with such a large volume of the same commodity or a large proportion of the whole. As a rule, you are dealing with leather goods or canned pineapple or something of that sort, where it is one or two or three per cent, or a fraction of one per cent.

COMMISSIONER MANN: Take lumber and coal, for instance, which are very substantial movements in Canada.

THE WITNESS: Well, those factors would apply to elements of that character, too.

When you go to the extreme with the coal roads in the United States that are overwhelmingly coal, there just isn't enough traffic left to carry the constant costs of the traffic that is left, and the coal is generally the higher grade merchandise moving to and from the towns served, and that traffic is extremely truck competitive. At one time it could move at a very compensatory rate and carry very heavy burdens, but with the advent of competitive transportation in private and "for hire" trucking, the ability to pay there has substantially collapsed, so then you have to recover it where you can.



COMMISSIONER MANN: So that actually the magnitude is important, but what is also important is the ability of the remainder of the traffic to bear ---

THE WITNESS: What is happening today is part of the factor to be considered.

MR. SINCLAIR: Q. I wonder if I could ask Dr. Edwards a question just at that point, Commissioner Mann, and this is to bring the situation into Canada.

Where there is a railroad under the jurisdiction of the Board known as the Quebec North Shore & Labrador Railway, which runs from Seven Islands to Nob Lake, and that railway handles many millions of tons of iron ore a year, I was wondering if Dr. Edwards' views with respect to how you would cost iron ore traffic on that railroad would compare with his views as to costing grain; maybe that is a point that should be brought up.

A. Well, there is a parallel there; if this road handles only ore, the costing is simple; every dollar of expense and burden is laid against the ore. The plant was created to serve ore, and that plant must be supported by the traffic for which it was largely created, both as to the variable and the constant costs.

MR. SINCLAIR: I think that, maybe, brings it right to an issue that is not far away from us here.

COMMISSIONER MANN: I suppose that way on the Quebec & North Shore there wouldn't be much



high-priced traffic that would go to the competitors in transportation?

MR. SINCLAIR: Oh, yes.

COMMISSIONER MANN: High-priced traffic?

MR. SINCLAIR: Oh, yes. There is the very highly competitive air express.

COMMISSIONER MANN: On page 4, paragraph 2 -- and I think this was developed by Mr. Bandeen yesterday -- you spoke about "a sample of the prior empty movement"; could you give us an indication of what kind of sample this was, what the size was?

THE WITNESS: In the Canadian Pacific it is 2.5 per cent, but I don't have the percentages at hand for the Canadian National.

COMMISSIONER MANN: I think perhaps we can develop it from the total car numbers, and I have those here.

MR. SINCLAIR: We can get it for you.

COMMISSIONER MANN: Now, on page 9, paragraph 1 -- and perhaps it is rather a naive question -- I notice at about the middle of the first full paragraph on "switching time" you say:

"Canadian Pacific made additional studies at stations and yards where switching is done by road crews."

And it was the words "switching is done by road crews" that caught my attention, and there is probably a very easy explanation for it; do you mean way freight trains, or something like that?

THE WITNESS: Some yards in the Canadian



Pacific had regularly assigned yard engines, but the switching yard complemented theirs by freight train switching at these yards.

COMMISSIONER MANN: One more question, and this relates to paragraph 2 on page 24:

"An extensive body of branch line mileage, as well as elevator and yard trackage at the terminals and sidings from main tracks of the railways, is occasioned by movement of the study traffic."

Now, the word "extensive" refers to branch line mileage rather than elevator and yard traffic?

THE WITNESS: Yes.

COMMISSIONER MANN: Mr. Stenason, I believe, yesterday put on the record that the trackage for Canadian Pacific on sidings was 107.7 miles, and 127.8 miles for yard and elevator traffic.

THE WITNESS: Well, you want the figure for the Canadian National?

MR. SINCLAIR: Of the percentage of the sample.

COMMISSIONER MANN: If you have it.

THE WITNESS: Two hundred and ten miles of yard trackage, but no sidings.

THE ACTING CHAIRMAN: Thank you very much, doctor.

MR. SINCLAIR: We will have Mr. Smith tomorrow morning at ten.

THE ACTING CHAIRMAN: Yes, Mr. Smith tomorrow morning. We will adjourn now until ten o'clock tomorrow morning.
---Adjournment.

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